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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • JULY 7, 1945

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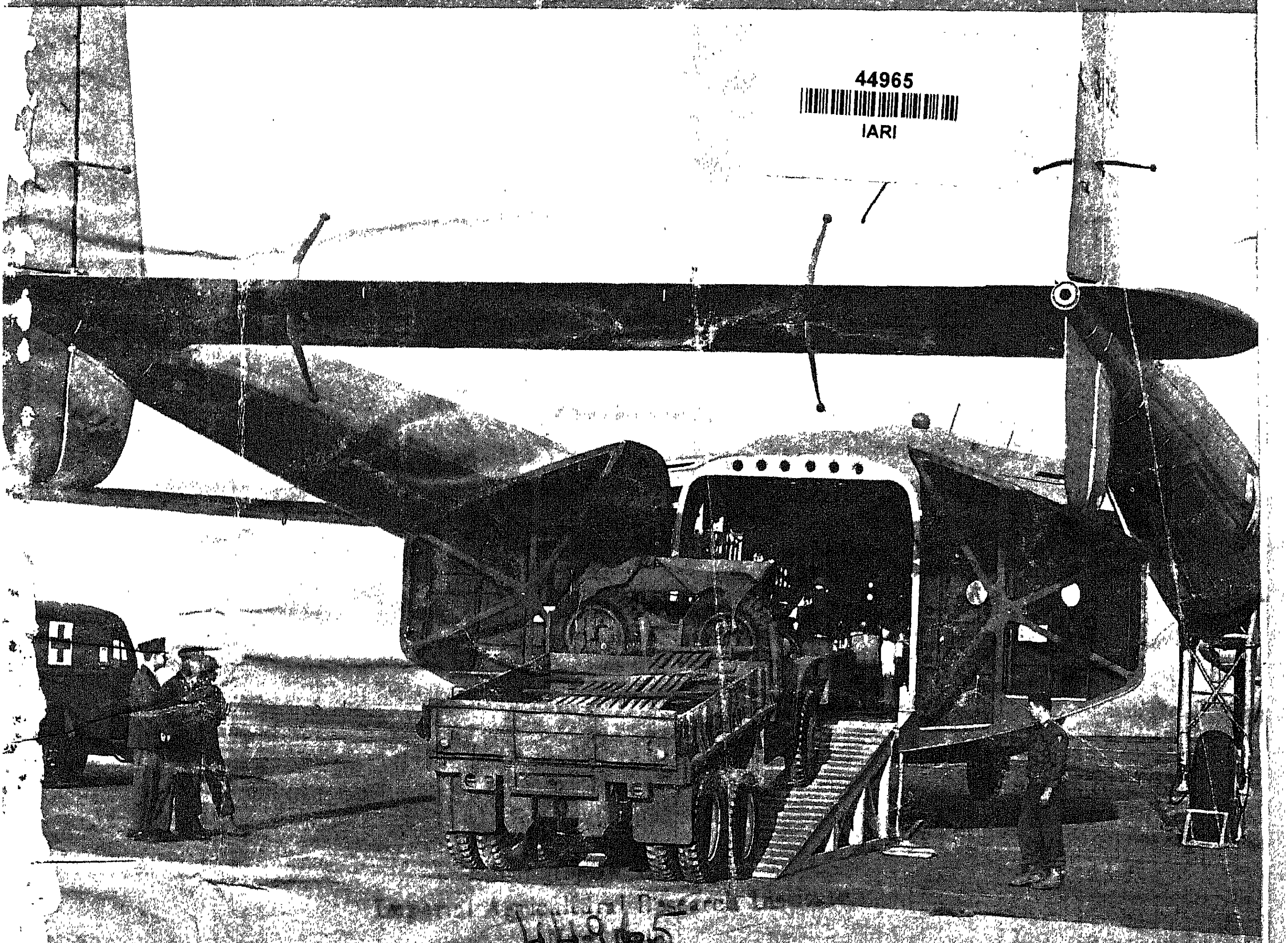

Imperial Agricultural Research Institute
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Increased Capacity
See Page 3

A SCIENCE SERVICE PUBLICATION

MEDICINE

Virus Weapon Sought

150 penicillin-like substances have been investigated in the hope of discovering anti-virus chemicals to fight colds, polio and similar diseases.

➤ SEARCHING for a weapon like penicillin and the other antibiotics that will conquer virus diseases such as colds and infantile paralysis, scientists at Rutgers University and the New Jersey Agricultural Experiment Station have tested 150 microorganisms that might produce anti-virus chemicals.

The experiments are reported in *Science* (June 29), by Miss Doris Jones, Prof. F. R. Beaudette, Dr. Walton. B. Geiger and Dr. Selman A. Waksman.

Only three microorganisms showed signs of possible action against the fowl pox virus which was the virus chosen for the search. Of these three, the active principle of one was actinomycin A, known to be highly poisonous to animals and therefore unsuitable for consideration as a remedy. The other two have not yet been studied enough for claims to be made about their anti-virus potentialities.

The organisms were isolated from straw-compost, manure, soil, drainage material and soil enriched with virus concentrates.

Bacteria, fungi and actinomycetes living in such material might, it was hoped, have developed antagonism for the viruses of fowl pox, laryngotracheitis and chick bronchitis.

The action of the microrganisms was tested by exposing the viruses to culture filtrates of the organisms and then inoculating the virus in chick embryos which they ordinarily can infect. Failure to infect the embryos would indicate anti-virus action of the test organisms.

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PHYSIOLOGY

Can See by "Black Light"

Patients who have had the lens of the eye removed in an operation for cataract are able to see by ultraviolet light, invisible to ordinary vision.

➤ PATIENTS who have had the lens of the eye removed in an operation for cataract are able to see by ultraviolet light, invisible to ordinary human vision and popularly known as "black light." This fact was investigated in experiments conducted by Prof. George Wald of the Biological Laboratories of Harvard University.

Such patients could read the eye testing chart from top to bottom under ultraviolet lighting which made it impossible for Prof. Wald himself to see the chart.

The eye lens in man is yellow in color, Dr. Wald says in his report to *Science* (June 29). It acts like the yellow filter a photographer puts on his camera to photograph the sky. That is, it filters out light at the ultraviolet end of the spectrum, making the eye blind to it although the sense organs behind the lens, like the photographic film behind the filter, are sensitive to light of that color.

The liquid in the eye, the cornea and ocular humors, also absorb some light in the violet and ultraviolet, Prof. Wald reports.

With the yellow lens taken away, the sensitiveness of the eye to violet and ultraviolet is tremendously increased. For light of 365 milli-microns (in the upper part of the ultraviolet) the average sensitivity of the eyes with lenses removed is 1,000 times that for normal persons.

"In this radiation," Prof. Wald said, "I have frequently had 60- to 70-year-old aphakics (persons with lens removed) read a Snellen chart from top to bottom, under circumstances in which I was unable to see the chart."

"It has long been known that certain insects are highly sensitive to ultraviolet light," he pointed out, "and it has been alleged that they respond to it with a special quality of color sensation. . . . This need no longer be a matter of pure speculation."

The lens is not the only yellow filter in the human eye. In the center of the retina itself there is a yellow patch, the yellow coloring matter of which Prof. Wald found to be a chemical similar to the yellow coloring of plants. It probably is actually the same chemical, xanthophyll or $C_{10}H_{51}(OH)_2$.

The depth of the coloring in the yellow patch varies greatly, Prof. Wald found. In one person no pigmentation was perceptible; in another the pigment absorbed more than 90% of the light at 436 milli-microns. On the average, about 60% of light of wavelengths from 430 to 490 milli-microns, through the violet and blue range, is filtered out by this coloring matter.

Prof. Wald's findings were made in the course of an investigation designed to gain more exact knowledge of the sensitivity of the rod cells of the eye, and the cone cells, measured at the center of the eye and at its periphery, under bright light and dim illumination.

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CHEMISTRY

Luminous Paint Reduces Dangers in Operating Room

➤ THE USE of luminous paint on the walls, ceiling and floor of an operating room would eliminate shadows from the surgeon's hand and instruments, and reduce danger from the sudden failure of lights during an operation, reports Engineer Morozov of the Soviet Scientists Antifascist Committee.

The light rays appear to come through the solid walls and ceiling. An even light with no shadows is created by using a mercury vapor lamp with a black reflector in the room painted with the luminescent paint.

The paint is made by mixing small quantities of zinc or cadmium sulfide with ordinary paint pigments. It will give off light for about an hour and a half after the invisible ultraviolet rays have been switched off. It is also activated by natural daylight as well as artificial light.

These luminous paints have been thoroughly tested at the Union Electromechanical Institute under the direction of Prof. S. O. Maizel. Walls of a room, painted with the compound before the war, still continue to give off light despite the fact that all the windows were blown out of the building by bomb blast in January, 1941, and the paint was subjected to all kinds of weather conditions for almost three years.

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MEDICINE

Surgery in Hemophilia

Successful skin grafting operation has been per- rmed for the first time on a hemophiliac. The bleeding as controlled by thrombin.

➤ SUCCESS in what is believed the 'st attempt at skin grafting on a hemophiliac, or "bleeder," is reported by Dr. Charles S. Davidson and Dr. Stanley M. Levenson, of Boston City Hospital and Harvard Medical School. (*Journal, American Medical Association,* June 30.)

An active thrombin preparation applied to the place from which the skin graft was taken apparently was responsible for saving the patient from bleeding to death from this wound.

The patient, a 26-year-old man, suffered from the hereditary bleeding disease, hemophilia. He had had to go to the hospital 13 previous times for bleeding from a cut lip, bleeding when he lost his "milk" teeth, bleeding from cuts on his knee and similar episodes.

Operations of any kind are not often undertaken on such patients because of the great danger of their bleeding to death. Excessive bleeding after such a simple operation as pulling a tooth has been a common cause of death in hemophiliacs.. Now that active thrombin preparations are available, however, hemophiliacs can have teeth pulled with relative safety.

The skin graft reported today was required because of an injury to the patient's right leg. Originally this was a bruise in which the skin was scraped off. This healed satisfactorily but after a second injury on the same place three and a half weeks later, swelling, pain and infection set in. The gangrenous skin had to be removed and later grafted with fresh skin.

The graft was taken from the patient's left thigh. Bleeding at this place was controlled instantly, the doctors report, by applying a mixture of powdered sulfanilamide and thrombin. The area healed in nine days and the graft took excellently.

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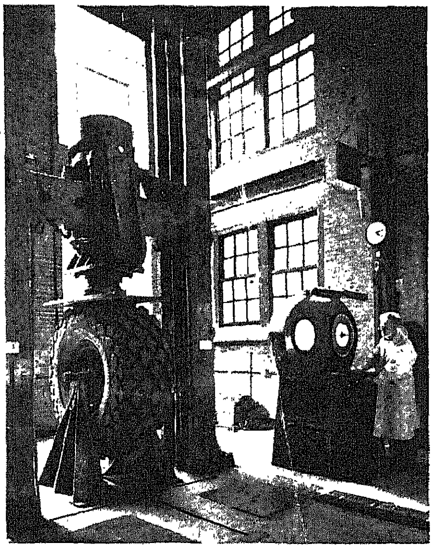

TESTS TIRES—An earthmover tire is given a deflection test under normal load by this huge tire testing machine installed at the Goodyear Tire and Rubber Company's plant. The operator is John Ward, development engineer for the company.

PHYSICS

Thickness Measured

Thickness of steel in walls of a boiler tank, or the level of liquid inside the tank, can now be determined accurately by using a new instrument, the Penetron.

➤ THE THICKNESS ~~of the steel in~~ the walls of a boiler tank, or the level of the liquid inside the tank, can now ~~be~~ determined accurately without drilling holes through the metal by means of a new instrument that employs radium rays from a commercially available radium salt. It can be used to measure the thickness of any type of material, and also to determine the densities of liquids.

The new instrument, called a Penetron, was demonstrated to a group of scientists in New York by the Texas Company as it is a product of a subsidiary, the Texaco Development Corporation. It will be manufactured and sold by Engineering Laboratories, Inc., Tulsa, Okla.

In use, the portable 40-pound Penetron is placed in position against the outside wall. It does not require access to the containing vessel. The apparatus has a detector head connected through a flexible rubber-coated cable to a control case. In this is electronic equipment, and on it is mounted the meter from which readings are taken.

The principle on which the instrument works is simple. Penetrating gamma rays emerge from a radioactive source. They impinge on the wall and penetrate it. Some emerge on the opposite side, and having no useful purpose, are disregarded. Another portion of the radiation is scattered in all directions by the electrons of the atoms which make up the wall. Some of these emerge on the same side of the wall from which they entered. These are the ones used to determine the wall thickness. They constitute the so-called back-scattered radiation.

By measuring the intensity of this back-scattered radiation, thickness is determinable, because, in a wall of any given composition, the intensity increases as a direct function of the wall thickness. In determining liquid level, the instrument is moved slowly down along the wall until a change in the meter reading is noted due to a variation in the intensity of the back-scattered radiation from the wall of an empty tank and the same wall when backed by a liquid.

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AERONAUTICS

Heavy-Cargo Army Plane Has Square Fuselage

See Front Cover

➤ THE PACKET (shown on the front cover of this SCIENCE NEWS LETTER), a completely new airplane for transporting heavy and bulky cargo produced for the Army, will be displayed at Hagerstown, Md., to a group of scientists and aviation writers by the maker, Fairchild Aircraft. The body of the plane is nearly square in cross-section, increasing its capacity over the ordinary fuselage which is usually rounded. It has straight sides, a flat ceiling and a level floor at truckbed height.

The fuselage is, in effect, a large flying truck or freight car with a total cargo capacity of 2,870 cubic feet. It can be loaded or unloaded through the tail doors, which when open, make an entrance eight by eight feet. When the

[illegible] Research Institute

plane is on the ground its floor is level, permitting easy loading direct from trucks or up ramps. A small door on the left forward side permits simultaneous loading.

The wings of this new plane are high enough above the ground to let trucks pass under them with safety to both, and its horizontal stabilizer is 14 feet above the ground so the largest trucks can back up to the tail door free from obstructions.

The Packet is powered by two Pratt and Whitney Wasp engines of 2100 horsepower. It is able to lift a load of 18,000 pounds after a ground run of only 800 feet. It is constructed of aluminum alloy. Its empty weight is 28,000 pounds and its useful load 22,000 pounds. Its cruising speed is over 200 miles an hour and maximum range is 4,000 miles.

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ENTOMOLOGY

Million Crickets Killed

Crop-devouring Mormon crickets may be killed at the rate of one million per square mile by chunky-bodied wasps belonging to one species.

➤ ONE MILLION crop-devouring Mormon crickets may be killed per square mile of territory in a season, by chunky-bodied black wasps belonging to one species, Dr. Ira La Rivers of the University of Nevada estimates on the basis of careful counts made on measured sample plots in the field. He tells of his observations in the new issue of the *American Midland Naturalist* (May).

Mormon crickets are not so called because Mormons regard them with any favor. Quite the contrary, they are among the worst insect pests that beset farmers in Utah and surrounding states; their crawling, hopping hordes at times lay waste fields in the intermountain basin of the West as did the locust plague of ancient Egypt. That is why the heavy slaughter inflicted on them by the wasp is both important and welcome, not only to Latter-Day Saints but to all the inhabitants of the land.

Dr. La Rivers studied the hunting behavior of the cricket wasp long and carefully. Almost invariably, he says, she first digs the burrow in which she will later place her prey. Then she goes out to get her cricket.

She pounces on it from the air and, usually after a rough-and-tumble struggle, succeeds in stabbing the cricket one or more times on the underside of its body with her sting. This permanently paralyzes the cricket; sometimes even kills it.

Since the cricket is several times larger than the wasp, she is unable to fly off with it, but must drag it over the ground, ant-fashion. Sometimes the kill is made 20 or 30 feet from the burrow. Since the wasp apparently has no very keen sense of direction, she often has a hard time finding her way back; occasionally fails altogether.

Once arrived at the burrow, she shoves the stunned cricket in, usually head first, and deposits an egg near the base of one hind leg. Then she goes off in search of another cricket. As a rule, two paralyzed crickets, each with its wasp egg attached, are placed in each burrow before the wasp closes it up with soil and heaps a little mound of pebbles and bits of twig over the top. In this grisly catacomb the wasp's larvae hatch from the eggs, and feed on the living bodies of their helpless hosts until they are full grown and ready to undergo transformation into adult wasps and emerge into the upper world.

Two cheater insect species sometimes dog the wasp's steps as she drags her quarry home, like jackals hanging on a lion's heels. They are both members of the group known as flesh-flies. After the wasp has deposited the cricket in the burrow and attached her egg, one of these flies will slip in. Instead of laying eggs, these flies deposit tiny larvae already hatched and hungry, which immediately begin to feed on the cricket's body.

There is a third cheater, another species of wasp, that sometimes gets into the still-open burrow, crushes the cricket-wasp's egg in her jaws, deposits an egg of her own and hastily closes up the excavation. The whole business reminds one of the laying habits of the European cuckoo.

The cricket-wasp also has enemies that attack the adult insect herself. Two of them are mammals, a carnivorous field-mouse and a shrew. Three are bird species, one of them a sparrow-hawk.

Dr. La Rivers has also noticed behavior on the part of the Mormon cricket suggesting a possibility that the cricket may occasionally turn the tables on the wasp, seizing and devouring her when she is preoccupied with digging her burrow or dragging home the body of another cricket.

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Cultivated *guayule,* an American source of natural rubber, is ready to harvest in four to five years if grown on good well-watered soil; wild guayule in its arid native southwestern home requires twice this time to mature.

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AERONAUTICS

Huge Cargo Carrier

The Hermes, a gigantic airplane, is now under construction in England. It transports freight at four miles a minute with 2,000-mile range.

➤ THE HERMES Cargo Carrier, a gigantic airplane, has been announced by the Society of British Aircraft Constructors. It is under construction by the Handley Page Company, which is also building the 50-passenger Hermes transport, of which the new cargo plane is a version. Like the passenger model, the cargo plane is a low-wing, all-metal, four-engined ship. It will carry a useful load of 16,000 pounds.

The four radial air-cooled engines of this cargo carrier give a total maximum output of 6,600 horsepower. The maximum speed of the airplane is 340 miles an hour, but its economical cruising speed over long distances is 240 miles an hour, or four miles a minute. Its range is 2,000 miles.

British aircraft industry, with the European war over, is converting rapidly to the construction of civilian planes, both by remodeling war planes and by designing new planes which include improvements developed in constructing war planes. The British Minister of Civilian Aviation has announced that British airlines will use British aircraft, thus encouraging the industry.

The new Hermes is not as large as the new British flying boat, Shetland, which is a 70-passenger transoceanic airliner even larger than the Mars, the largest American-built flying boat. The Shetland is a 130,000-pound craft, while the Hermes is rated at 70,000 pounds. The Shetland has a greater wingspan than the famous American B-29 Superfortress.

Another new British plane is the Viking, an airliner with a range of 1,500 miles and constructed to carry 21 to 27 passengers. It is a single-engine plane that promises to play an important part in the development of postwar air routes to the continent of Europe. The Marathon is a new four-engined plane designed to carry 14 passengers and a half-ton of luggage and freight over a distance of 750 miles at a speed up to 200 miles an hour.

The Halifax Civil Transport is a conversion of the well-known Halifax bomber that carried much destruction to German war plants. It can accommodate 11 passengers and 8,000 pounds of freight. The equally well-known Mosquito, Lancaster and Spitfire are also under conversion for civilian uses.

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ZOOLOGY-TAXIDERMY

Miniature Animals of Plastic Look Alive

➤ THE ZEBRA guarding her young colt, American elk in mortal combat, and the rare bongo antelope of Africa, are but a few of the animals which Louis Paul Jonas, taxidermist and sculptor, has prepared for his Lilliputian Noah's Ark.

The elephant and the field mouse, the giraffe which towers above the hippopotamus—all are one-tenth the size they would be in real life. Although the number of mammals represent but a fraction of those known, the collection is the most extensive of its kind. The individual animals have been made with great accuracy and artistic skill.

Mr. Jonas, who converted an abandoned railroad station at Lake Mahopac, N. Y., into a studio, believes that models should be made so children can handle them. To make this possible he developed a plastic that is practically unbreakable—the delicate horns and long tails will last under handling. He decided to make the models one-tenth natural size, as he felt this was an easy scale for anyone to comprehend.

In making the models, first the skeleton or armature of the animal is created to exact scale. This is drawn on cardboard, cut out, and lined with wire so that the limbs can be bent into the desired position. The animal is then set upon a base and is ready to receive the clay from which the mold will be made.

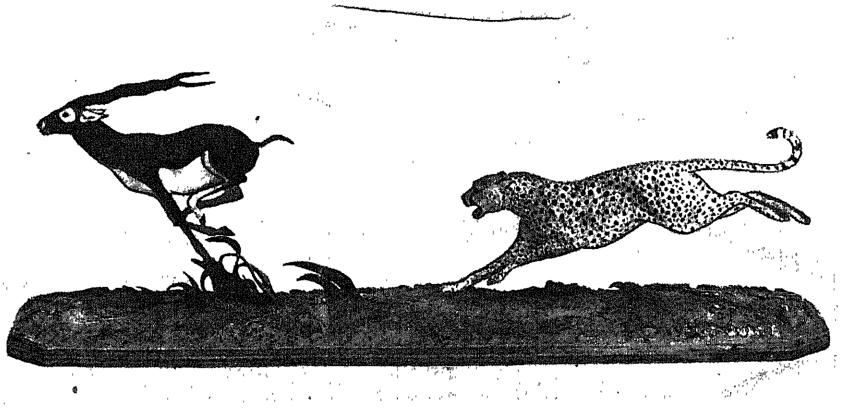
"You can well imagine how important it is to have a knowledge of the animal's anatomy when one works from the bones out," states Mr. Jonas. Throughout the process careful measurements are frequently made. About two weeks of hard work, exclusive of watching the animal at the zoo, studying pictures, and reading about it, is usually needed to make a model.

A plaster mold is cast from the clay sculpture, and self-vulcanizing rubber latex, of which the finished animal is made, is forced into the mold by compressed air.

Only a limited number of duplicate animal models are made in the finished mold since the impression eventually wears down. The original clay models, though damaged from casting, are saved and can quickly be put into shape for re-casting.

The latex plastic does not harden until it is removed from the mold and baked for 15 minutes or so. The cast shrinks slightly during baking. After the model is tooled, it is shellacked, mounted on a base and fitted with eyes. Prepared with a ground white, it is ready for the final coating of oils.

A simple animal like a bear, which only requires two or three colors, can be



ONE-TENTH NORMAL SIZE—The African black buck pursued by a cheetah is one of the most intricate animal groups in the collection recently exhibited at the Chicago Natural History Museum. Both of the miniature animals are practically in mid-air.

painted in an hour, but sometimes a day or more is needed to paint an intricate mammal like a jaguar or a giraffe. Oil paints are blended to achieve the elusive quality of an animal's coat.

The cheetah pursuing a black buck antelope was one of the most difficult animal groups to make. Both of them are practically in mid-air—the cheetah has just one paw touching the ground—yet no additional supports are necessary.

The klipspringer, a little antelope, is one of Mr. Jonas' favorites among the almost 90 animals. Capable of springing up on a 30-foot rock, in real life it is only about 22 inches high.

The elephant and the field mouse have proven most popular with children, who enjoy the contrast in size. The animals this past year have been exhibited at the American Museum of Natural History and the Chicago Natural History Museum so children and grownups alike would have an opportunity to enjoy them.

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ASTRONOMY

To Observe Eclipse

Amateur astronomers will fly to Montana to observe the event of July 9. Will take photographs from the air if the weather is bad.

➤ AMATEUR astronomers will fly from New York to Butte, Mont., to observe the sunrise eclipse on July 9. If the weather does not permit ground observations, the entire expedition will fly above the clouds to take photographs.

A Lockheed airliner, owned by Sperry Gyroscope Company of Brooklyn, N. Y., will furnish transportation both ways for members of the Amateur Astronomers Association, Inc., which has headquarters at the Hayden Planetarium in New York. R. E. Gilmor, president of Sperry Gyroscope, announced that there would be no charge to the amateur astronomers for use of the plane and its crew.

The expedition will take off from MacArthur Field, Long Island, on July 7, and land near an appropriate observing site near Butte, Mont., where the total phase of the eclipse occurs soon after sunrise.

On Sunday, July 8, the equipment will be set up. It is expected that color motion pictures of the partially eclipsed sunrise will be made, followed by the same for totality. The largest instrument carried in the plane will be a four-inch camera of 10-foot focus, giving an image of the sun itself about one and one quarter inches in diameter.

If weather does not permit ground observations, the entire expedition will take off again early Monday morning, fly above the clouds to take the photographs, and then head straight back to Long Island.

The plane will carry relatively few persons as most of its passenger space has been cleared for observing equipment. The party will include, in addition to the crew, George V. Plachy, secretary of the society; Peter A. Leavens, director of the society's camera station at Sayville, Long Island, and in charge of the expedition's photographic equipment; and a few other observers and amateur astronomers.

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Justifies Trips

➤ ALTHOUGH there is a war still being waged, the total eclipse of the sun on Monday, July 9, is a sufficiently rare and important event to justify astronomers traveling to the path of totality to observe it, Dr. John Q. Stewart, Princeton University astronomer, said.

"Before V-E Day it was announced that the Russians were sending no less than 22 expeditions of astronomers to various parts of that war-torn country," Dr. Stewart said, speaking as guest of Watson Davis, Science Service director, on the CBS program "Adventures in Science."

The eclipse will be observed also in Norway and Sweden as well as in the United States and Canada. Amateurs as well as professional astronomers are visiting the narrow band of totality that will begin at sunrise in Idaho.

Dr. Stewart explained that he has enlisted the help of some 60 foresters stationed in the path of totality in studying the advancing shadow of the moon at the time of the eclipse. Dr. Stewart himself will observe the eclipse from a point near Malta, Mont., where the sun will rise partially eclipsed.

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CHEMISTRY

Improved Methods for Extracting Actinomycin

➤ JUST as sulfanilamide, the sulfa drug, was joined by a considerable family of chemical cousins within a few years of its original discovery, so now we may expect related extracts from earth-dwelling molds to join penicillin, the first widely publicized and used germ-stopper of that origin. One such compound, known as actinomycin, together with a method for extracting it, is the subject of two new U. S. patents and assigned to Merck and Company, Inc.

The first patent, on the mold chemical itself, is No. 2,378,876, taken out by Prof. Selman A. Waksman of Rutgers University and Dr. Harold B. Woodruff, scientist in Merck's employ. Actinomycin, as they describe it, is a red substance left after a mold known as *Actinomyces antibioticus* has been subjected to ether extraction and the extract then evaporated. It can be chemically separated into two fractions, designated respectively as A and B. Actinomycin A is stated to be especially powerful in its action against certain microorganisms.

The second patent, No. 2,378,449, was granted to another Merck employee, Dr. Max Tishler, and covers an improved method for extracting Actinomycin A.

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SEISMOLOGY

Double Earthquakes Recorded in California

➤ TWO earthquakes, centered close together in the Lower California region, wrote their autographs on instruments in several American observatories on Wednesday, June 27, seismologists of the U. S. Coast and Geodetic Survey reported.

The first, which began at 9:08.3 a.m., EWT, had its epicenter near latitude 27 degrees north, longitude 111 degrees west. The second quake began at 2:08 p.m., EWT, and centered about 100 miles southwest of the first, approximately in latitude 26.5 degrees north, longitude 112.5 degrees west. Both were indicated as moderately strong shocks.

Stations reporting were those of St. Louis University, Georgetown University, and the observatories of the U. S. Coast and Geodetic Survey at Tucson, Ariz., Ukiah, Calif., Sitka and Honolulu.

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PHYSICS

New Refrigerator

May employ a high speed rotor for its sole moving part and be capable of producing temperature drops as great as 270 degrees Fahrenheit.

➤ A NEW and ingenious mechanical refrigerator employing a high speed rotor for its sole moving part and capable of producing temperature drops as great as 270 degrees Fahrenheit with high efficiency has been proposed by Prof. J. R. Roebuck of the University of Wisconsin (*Journal of Applied Physics*, May).

By combining the conventionally separate processes of compression and cooling of the refrigerant, the new refrigerator approximates for the first time in a practical fashion the thermodynamical ideal Carnot cycle with the resulting high efficiency. The principle of ideal refrigeration formulated by the early French physicist Carnot (1796-1832) states that for greatest efficiency the refrigerant must be cooled as it is compressed, thus maintaining a constant temperature while heat is being given up; and then it must expand and do work without taking on any heat to produce the greatest cooling.

The proposed device employs a strong hollow cylindrical rotor spun at a high speed through which the gaseous refrigerant passes to be cooled. The gas enters at the center of the rotor at one end. Centrifugal force which is proportional to the distance from the center causes the gas to be compressed as it moves out to the rim of the rotor.

This centrifugal compression causes the gas temperature to rise and allows the heat contained in the gas to be transferred to cooling coils placed inside and spinning with the rotor.

Thus the gas is compressed at a constant temperature, and at the rim of the rotor it is highly compressed but at essentially the same temperature as it had on entering.

Then by allowing the gas to flow back to the center of the rotor through insulated passages, the temperature drops as the centrifugal compression is removed and as the gas does work on itself in expanding. Thus the gas is expanded while doing work with no heat transfer, and the two parts of the ideal Carnot cycle are approximated.

Because of the compression and heat transfer that takes place, the gas in the ducts going back to the center will be denser than that going outward, and therefore flow in the forward direction requires that the gas pressure be higher at the input than the output. The power required to maintain this pressure difference causes the refrigeration. Practically no rotational energy is extracted from the rotor because all the rotational energy taken from the rotor by the gas when moving outward is given up again when it moves back into the center.

The temperature drops produced are dependent upon the rotational speed of the rotor and therefore the structure must be made very strong to support the enormous centrifugal stresses.

Typical uses proposed for this refrigerator are commercial refrigeration by cooling air as the refrigerant from room temperature to about 70 degrees below zero Fahrenheit in one stage; the liquefaction of gases by using several stages in succession; and winter heating of homes by using a modification of the device as a Kelvin heat pump.

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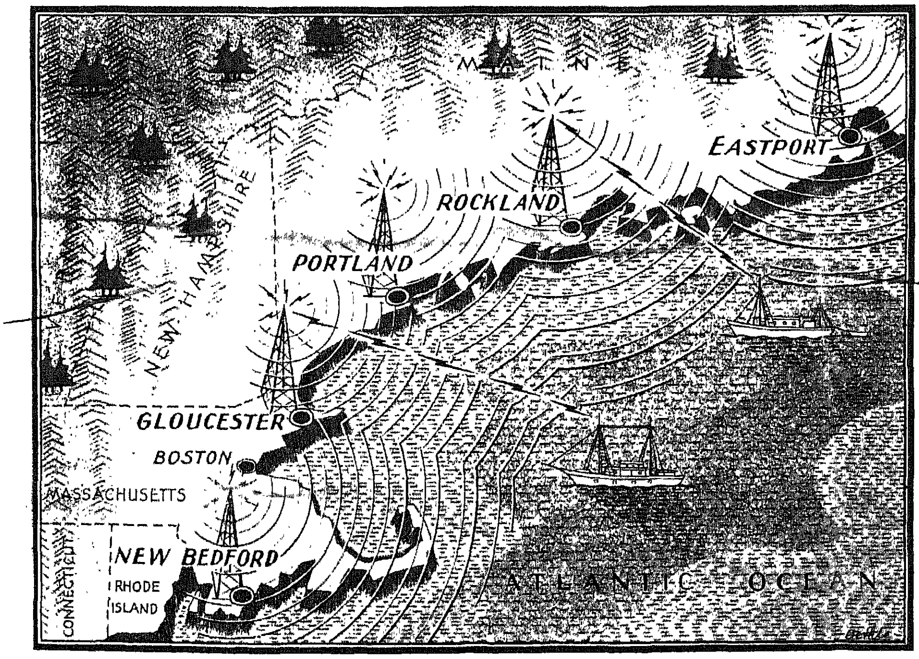


AID SHIPPING—Five new coastal harbor radiotelephone stations will soon be in operation on the New England coast. The stations will be particularly valuable to the great fishing fleets from New England ports operating in the north Atlantic.

COMMUNICATIONS

Five New Radiotelephone Stations Are Planned

➤ SIX instead of one coastal harbor radiotelephone stations will soon be in operation on the New England coast for the benefit of shipping on the Atlantic if applications now filed with the Federal Communications Commission are approved. They will be installed by the Raytheon Manufacturing Company ~~of this city~~ at Eastport, Rockland and Portland, Maine, and at Gloucester and New Bedford, Mass. The one existing station is at Boston, operated by the New England Telephone and Telegraph Co.

While the service will be of benefit to all shipping in the general area, it will be particularly valuable to the great fishing fleets from New England ports operating in the north Atlantic. The new stations will also provide service to properly equipped trucks and buses within their ranges.

Science News Letter, July 7, 1945

Bamboo, treated with plastics to make it water- and insect-proof, is being used in Latin America to crate foods for ocean shipment.

PSYCHIATRY

Facilities Are Meager For Discharged NPs

➤ THE DISCHARGED soldier who needs treatment for shattered nerves or mental illness may not be able to find it, a survey made by the National Committee for Mental Hygiene rveals.

There are 25 states without a single community clinic and “vast areas” in other states where no psychiatric help is available, it was found. Of all the established hospitals and clinics in the entire country, only 139 certified their preparedness to treat mental casualties.

Although the veteran is entitled to treatment, the Veterans Administration can't provide it when neither clinics nor psychiatrists are available, the Committee reports.

“The number of Veterans Administration neuropsychiatric hospitals is at present limited to 30,” the Committee states. “They offer hospitalization to all who need it but there is overcrowding. The most serious deficiency, however, occurs in connection with outpatient treatment. Because many of these hospitals are located near large cities the outpatient treatment which they have to offer is impossible for men who live in the country.

“Besides, the Veterans Administration cannot furnish or find anything like adequate outpatient clinic facilities for all those dischargees who do not need to be hospitalized but do require psychiatric treatment.

“This lack of outpatient care is very serious. Both in the interest of the veteran and in the interest of the citizenry at large, psychiatric care should be available throughout the country; this would necessitate increasing the present number of psychiatrists by at least 10,000 together with the necessary auxiliary staffs.”

Science News Letter, July 7, 1945

PLANT PHYSIOLOGY

Colchicine in Small Doses Speeds Plant Growth

➤ COLCHICINE, the “evolution chemical” that has been used to originate new species of plants by multiplying the heredity-bearing chromosomes of old ones, also has the power of greatly speeding up plant growth when used in weaker concentration, Prof. Earl E. Newcomer of the University of North Carolina states. (*Science*, June 29).

Prof. Newcomer used colchicine in a four-tenths of one per cent solution. He placed one drop of this per day on the growing points of young oak and chestnut trees, hazel bushes and other plants. In some cases the treatment produced unfavorable results, even death, but in 16 seedlings of the species named he found that growth went on at double the usual rate.

In previous researches by two Chinese researchers, T. Loo and Y. Tang, a speeding-up of seed germination in corn, rice, wheat, cabbage and mungo bean had been reported.

Science News Letter, July 7, 1945

PALEONTOLOGY

Fossil Mites Found in Marble Desk Pen Base

➤ TWO FOSSIL mites, eight-legged creatures related to spiders, have been found embedded in the polished stone of desk pen bases made of onyx-marble from a quarry in Arizona. They represent an entirely new group of arachnids, states Prof. Alexander Petrunkevitch, Yale University paleontologist, who has made a close study of them.

The two specimens are quite small: over-all body length is approximately one-eighth of an inch, which is also the length of the longest leg. They are remarkably well preserved; the bristles with which they were covered and the tiny claws at the ends of the legs are clearly visible under low powers of the microscope.

The onyx in which the specimens are embedded was formed out of lime-charged water in a cave of relatively recent geologic date, classified as Cenozoic by geologists. The dead mites were apparently washed in and left behind in the thickening calcite slush as the water slowly evaporated. Finally it hardened to solid, ~~dark-brown~~ stone, holding them fast.

The two pen-bases were sent to Prof. Petrunkevitch by J. W. Fisher, president of the company that owns the quarry. One of them has been returned to him; the other, which holds the type specimen, is retained in the Peabody Museum.

Because certain details of the leg formation suggest that the mites may in life have progressed ~~with a kicking~~ movement, the new genus has been given the generic name *Calcitro*, which is a Latin word meaning “kicker”. The second or specific name is *fisheri*, in honor of Mr. Fisher, the original finder of the specimens.

Detailed description of the new fossil species is published in *American Journal of Science* (June).

Science News Letter, July 7, 1945

IN SCIEN

ASTRONOMY

Venus Mistaken for Jap Balloon by Observers

➤ THE PLANET Venus, which is bright enough to be seen in daylight, was mistaken by lookouts for Jap balloons, a number of which have been reaching the Pacific Coast.

Inmates at San Quentin Prison, where regular watches are kept for the enemy balloons, reported recently that a Jap balloon could be seen very high and nearly overhead, though slightly south of the prison, states Leavitt Baker, Jr., deputy in charge of identification, communication and records. Several days later at about the same time a balloon was again reported in approximately the same position.

Upon contacting the Lick Observatory, Mr. Baker learned that the planet Venus was in the exact position indicated, and, though it had reached its maximum brightness late in May, was still visible to the naked eye in full daylight. Checking with the Interceptor Command, he learned that hundreds of reports had been received throughout the area for balloons in this position.

Science News Letter, July 7, 1945

ELECTRONICS

Super-Tool Measures Infinitesimal Movements

➤ AN ELECTRICAL instrument, so sensitive that it can measure movements, or changes in position, as small as one-tenth of a millionth of an inch, has been developed at the Battelle Memorial Institute. It is a new super-tool for scientists to measure the position of either slowly or rapidly moving objects without touching the object itself. Its first practical application was in measuring the errors in high-precision lathe spindles used in machining aircraft motor parts.

The instrument is also the heart of an apparatus for measuring and recording the changes in crystal structure when steel is heated rapidly, as in electric welding. Other possible, but as yet undeveloped, uses of this electrical micrometer are as a meter to indicate the power output of airplane engines in flight, and as a means of measuring roughness and hardness of metallic surfaces.

Science News Letter, July 7, 1945

E FIELDS

CERAMICS

Plants in Glass Pot Feed on the Glass Itself

➤ GROWING plants in glass flower pots will feed on the walls of the pots themselves if they are made of a new nutrient glass fertilizer. The glass will supply all the necessary food elements except nitrogen, organic matter and water.

This use is suggested by A. E. Badger and R. H. Bray of the department of ceramics engineering of the University of Illinois as one of the results of work carried out on the solubility of fused mixtures of rock phosphate, potassium carbonate, and silica.

Should proper solubilities be obtainable with the more complex mixtures, these scientists state, and costs be competitive with present fertilizers, glass fertilizers may offer interesting advantages. The ease with which glass can be manipulated, the scientists say, suggests many commercial adaptations for soilless growth experiments as well as ordinary applications for soil enrichment.

Science News Letter, July 7, 1945

NAVIGATION

Location of Submerged Sub Found by Observing Sun

➤ THE GEOGRAPHIC position of a submarine can be determined when it is 60 feet under water by observing the sun through the periscope.

In a submarine submerged off the Yucatan peninsula, Paul R. Frank took measurements of the sun as it crossed the meridian and found his position exactly. This is one of the first times a "fix" has ever been obtained from a submarine while submerged, he states in the United States Naval Institute Proceedings.

Navigators on submarines conducting submerged patrol near the equator might find useful the ability to obtain the position of the ship without surfacing, believes Mr. Frank, biographical information on whom must be kept secret for security reasons.

It would even be possible for the position of a submerged submarine to be secured not only near the ecliptic, but for all the Pacific submarine patrol areas, with an error of only about two miles, he states.

The sun was almost directly overhead at the time Mr. Frank determined his submerged position. Azimuth readings were taken at half-minute intervals from 10 minutes before until 10 minutes after local noon. From these data were found points on the earth's surface directly beneath the sun and only 150 miles away. The point of intersection of these lines accurately indicated the position of the ship, Mr. Frank reported.

Since the submarine was proceeding at slowest submerged speed, the movement of the ship was disregarded. The only difficulty encountered occurred when the ship slightly changed its position in relation to the horizon during one stage of the observations. But since the sun was so nearly overhead, a slight change in the angle of the ship caused a considerable and immediately apparent error in the bearings.

Science News Letter, July 7, 1945

AERONAUTICS

First Jet-Propelled Plane Is Now a Museum Piece

➤ AMERICA'S first jet-propelled airplane is now a museum piece, on display to the public at the Smithsonian Institution in Washington, D. C. It is the experimental plane built by Bell Aircraft Corporation for the Army Air Forces, and is the first jet-propelled plane constructed and flown in the United States.

No longer needed in the military service, because many additional jet-propelled planes have been built, it was transferred to the Smithsonian by the War Department to take its place in the Institution's historical collection of famous aircraft.

Science News Letter, July 7, 1945

HERPETOLOGY

Six Grass Snakes Arrive In U. S. from England

➤ SIX GRASS snakes have arrived at the Philadelphia Zoo from England. Although the grass snake resembles our own garter snakes, it is actually a water snake which differs from its American relatives by laying eggs instead of producing its young alive.

The coming of these snakes, shipped from the Regent's Park Zoo in London, marks the resumption of trading between the two institutions. A shipment of birds and mammals, now being readied at the zoo, will soon be sent to the London institution.

Science News Letter, July 7, 1945

CHEMISTRY

Eggs Kept in Water Glass Should Also Be Cool

➤ EGGS ARE scarce, and are expected to become scarcer. Persons who own chickens, or have any other means of acquiring surplus eggs, and who intend putting them up in water-glass, a time-honored method of preserving eggs, are advised not to depend on this method alone, but to keep them well refrigerated also, by Prof. G. O. Hall of Cornell University, who has just concluded a series of experiments in this field.

Eggs of uniform quality were placed in water glass and held for six months. One lot was kept at temperatures of 34 to 36 degrees Fahrenheit, another at 55 to 58 degrees, and a third at ordinary room temperature.

The eggs held at 34 to 36 degrees rivaled fresh eggs in all respects except flavor and odor. Of 189 eggs candled, 178 were of A grade quality or better. Appearance of these eggs on breaking the shells was satisfactory.

Of 239 eggs held from 55 to 58 degrees, 173 had to be classed inedible, according to recognized market classifications, because of stuck yolks.

In eggs held at room temperature (40 to 90 degrees, F.) none graded higher than B, and 142 of 187 were graded inedible because of stuck yolks. When broken, these eggs had little or no thick white and the yolks were very flat. It was difficult to break the eggs without mixing yolk and white, Prof. Hall reports.

Science News Letter, July 7, 1945

CHEMISTRY

Dinitrates Improve Diesel Fuel Ignition

➤ IMPROVING the ignition qualities of Diesel fuels by the addition of what might be called mild-mannered cousins of TNT is the at first slightly startling proposal that won patent 2,378,466 for Dr. George O. Curme, Jr., chemist in the laboratories of the Carbide and Carbon Chemicals Corporation.

TNT, nitroglycerin and other high explosives are trinitrates of carbon-containing compounds. To pep up the often sluggish ignition of diesel oils, Dr. Curme adds small percentages of the dinitrates of either polyethylene glycol or polypropylene glycol. These dinitrates are chemically somewhat similar to trinitrates, but are less temperamental in their behavior.

Science News Letter, July 7, 1945

POPULATION

Grandchildren of the War

The echo of the present war boom in babies is expected in 1965. These children will stand an exceedingly good chance of growing to maturity.

By MARTHA G. MORROW

➤ ANOTHER boom in babies is expected in the United States about 20 years from now when the stork brings large numbers of grandchildren of the great war. Babies born around 1965, a large number of them children of our war-boom babies, will stand an exceedingly good chance of growing to maturity—far better than did their grandparents or even their parents—thanks to the great advances being made in keeping infant and childhood diseases in check.

These grandchildren of the great war, much more than their parents, may enjoy quiet streets where they can ride tricycles and trees which they can climb, since an increasing proportion of the population probably will live in smaller cities and suburban areas.

The chance of their having at least four or five brothers and sisters will be less than for their own parents, for families are becoming smaller. They will also probably grow up in smaller houses than did their parents, due largely to the decreasing size of families, lack of servants and higher cost of building. There is likewise an excellent chance that they and nearly all of their playmates will have native-born parents. Today 13 out of 14 American babies are born to native parents, and unless there is a change in our immigration laws, few parents in 1965 will be foreign-born.

More Conservative U. S.

These babies, however, may grow up in a much more conservative and less exciting United States. Twenty years from now an increasing number of the voters will be older people, so the political parties will be more under their control, probably leading to an increasing tendency to keep affairs just as they are. The average age of stockholders in corporations will also increase, probably resulting in older men on the boards of directors and a less pioneering manner of conducting business.

People will probably be more interested in culture and the arts when they become of age than the average American is today. Youth is more concerned with forging ahead and making a place in the world; later in life there is apt to be more reflection and less action.

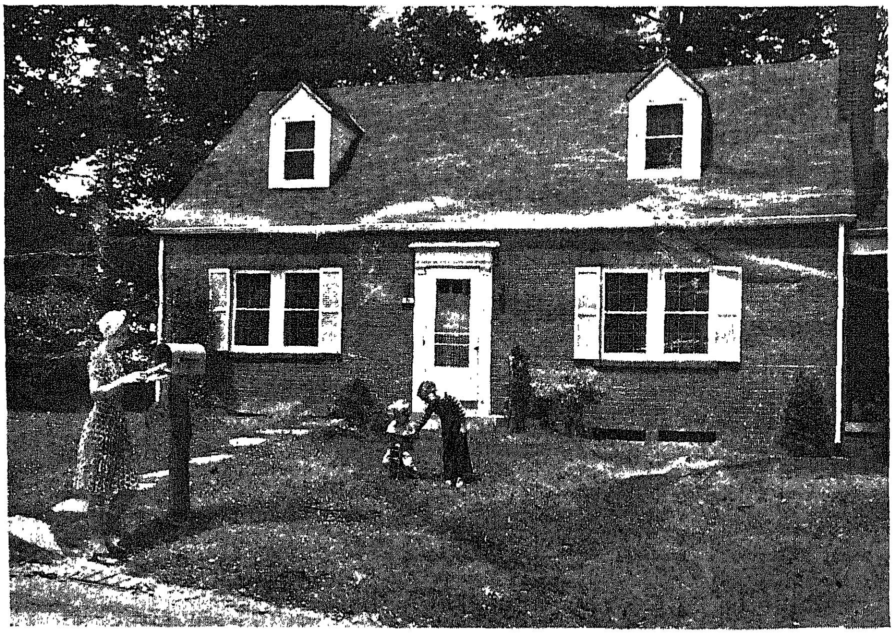
The average age of people in the United States has been steadily increasing. Half of the people in America in 1800 were 16 years of age or under. By 1900, the average population had increased in age and half of the people were around 23 years or under, the other half being over that age. Half of the people in 1940 were 29 years or under, and by 1965 there is a pretty good chance that the dividing line will come around 33 years of age.

Between 11 and 12 million children in the United States in 1965 will be learning to walk and talk, going to play or nursery school, being under five years of age. Those between five and 19 will number over 35,000,000. This is the estimate of two population experts, Dr. Warren S. Thompson and Dr. P. K. Whelpton of the Scripps Foundation for Research in Population Problems at Miami University, Oxford, Ohio.

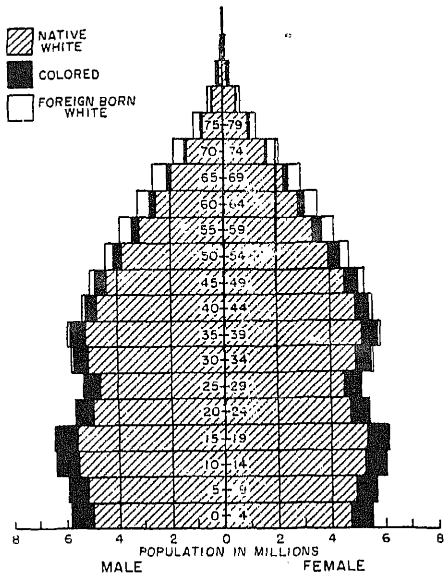
The largest proportion of the population will be between the ages of 20 and 44—there will be nearly 58,000,000 of these, a majority of them married and starting families of their own. People between the ages of 45 and 65 will number about 36,500,000, Dr. Thompson and Dr. Whelpton believe, while nearly 15,000,000 men and women will be 65 or over.

This means that about 156,000,000 people will probably be living in the United States in 1965, as contrasted with the 138,000,000 here today. But these population experts do not believe that the number of people in the United States will increase indefinitely. Their calculations show that the population is likely to reach a peak of 160,000,000 to 165,000,000 a few years before the end of this century, and then decrease slowly.

There will be a larger proportion of colored people in the United States 20 years from now than at present, about 17,500,000 being colored. There were 14,300,000 colored people in the United States at the beginning of this year and



CHILDREN OF 1965—Children of the war-boom babies of the United States, much more than their parents, will live on quiet streets. A greater proportion of the population will live in smaller cities and suburban areas 20 years from now. Photograph by Fremont Davis, Science Service staff photographer.



POPULATION CHART—An estimate of the number of males and females in the United States in 1965, their ages and whether they will be native white, colored or foreign-born white is given by Dr. Warren S. Thompson and Dr. P. K. Whelpton of the Scripps Foundation for Research in Population Problems.

unless we have immigration, the population of the United States within the next two decades will become increasingly colored, due primarily to a higher birth rate among Negroes than among white persons.

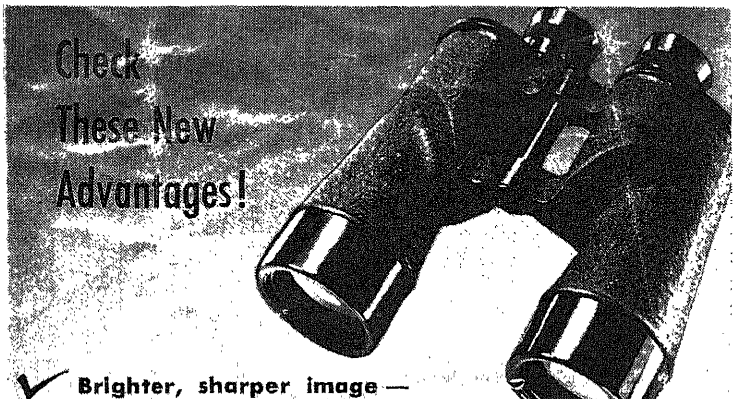
Most of the population increase is likely to go to smaller cities and suburban areas. Many of the additional men may work in big cities, but as a rule they will not live in them. The number of farmers and persons in farm families will probably decrease as more labor-saving machinery is used on farms. But farmers now work longer hours than city people. So, if working hours on the farm are cut, the farm population may increase.

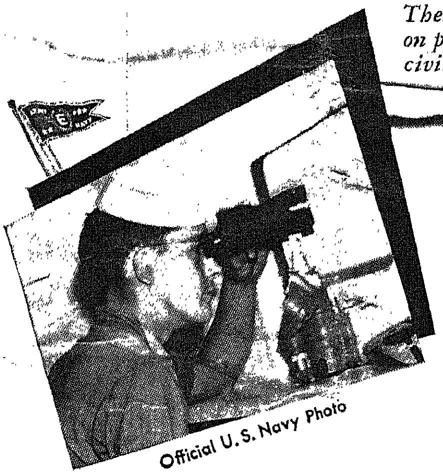
The proportion of the population in manufacturing and mining has been going down and probably will continue to do so. The proportion of doctors, lawyers and white-collar workers, on the other hand, will continue to increase.

Romances will lead to marriage at a younger age in 1965. During the last half century white girls have been marrying younger and will probably continue to do so. The majority of the boys who marry will do so between the ages of 20 and 27, while the girls will be 18 to 25. Many of the girls may continue to work until the husband is in a position to support them, but contraceptive information makes it possible to marry earlier without running as great a chance as in the past of starting the family before they are financially prepared to do so.

There will be fewer bachelors 20 years from now than there were before the war, for instance, as men will have a better selection. In the past males outnumbered females in the United States, chiefly because there were so many men among those immigrating to America. In the future there will be an excess of females here. But only about eight or ten percent of the women will remain single, about nine out of every ten having been married by the time they are 50.

There will be a decline in the number of children born in the future, as the





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Do You Know?

Ground *corncobs* are a satisfactory mulch for roses and garden plants in general.

Invisible *electrons* move through the tubes of a television set at a rate of 28,000 miles per second.

A *honeybee* visits some 200 flowers to gather a load of pollen on a single trip before returning to the hive.

Lime and commercial *fertilizers,* in spite of advice to the contrary, may be applied to the land at the same time and covered into the soil in one operation.

Lack of *vitamin C* causes bones to become brittle and break easily, and also prevents them from healing when broken.

A spiny species of *cactus* grows in Colorado at 7,000 feet above sea level; it is one of the few cacti that will stand cold winters.

Cobalt seems to be as essential in animal nutrition as it is in human nutrition; a cattle disease, that occurs in various sections of America, is thought to be due to cobalt deficiency.

Industrially important Engelmann *spruce trees* in four national forests in Colorado are facing destruction with an unprecedented increase in the hosts of a native, rice-sized beetle, *Dendroctonus engelmanni.*

decline in birth rate continues. It will be due more, however, to fewer children per family than any great decrease in the number of women having children.

The number of children who die will be quite low. In 1915, of every 1,000 white babies born alive, in the birth registration states, 99 died before they were one year old, and of every 1,000 colored babies, 181 died.

In 1943, 37 white babies per 1,000 died; 62 colored babies per 1,000 died. Colored people will continue to die younger, Dr. Whelpton stated, but because of poorer housing and a lack of money for medical care rather than for biological differences.

The life expectation of white males in 1965 will be about 67 years, whereas white females will have a life expectation of about 70½ years. This is because women are tougher biologically than men from the time they are conceived, and infant mortality is higher among men. The risks of childbearing are less than the occupational risks of men.

The average number of years lived by colored men two decades from now, if conditions continue as we think they will until 1965, will be about 60.3 years. The life expectancy of colored women will be about 62.5 years.

The average length of life of the American people in 1942, the highest to date, was 64.8 years. This does not mean that people are setting new records for longevity, for few live to be over 100. The expectation of life has gone up and will continue to go up after the war primarily because we succeed in getting a large number of babies to live to 60 or 70 years of age.

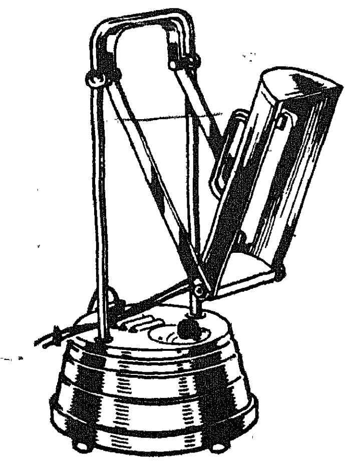
People in the future will die largely of old age. Heart failure, softening of the brain and hardening of the arteries will take large numbers of people. Research in many lines is making progress in catching diseases in time and prolonging life.

Population experts base their estimates for 1965 or any other future year by studying past trends. Excellent data are available at the U. S. Bureau of the Census, division of vital statistics, since 1933 as births and deaths throughout the whole United States have been reported since that time. Some idea of what happened between 1900 and 1933 can be secured by knowing what happened in the birth and death registration areas, but before 1900 there was no Federal reporting, and only a few states and cities kept their own records.

At different times in the past, compilations have been made on births and deaths which help in working out trends. In an early census, for instance, people were asked about those who died in the preceding year. Census information secured throughout the nineteenth century dealt with children under five, so that by allowing for those who died or were not reported, some idea of the number of children born during the preceding five years could be secured.

When a trend has been found, then the population expert must begin thinking about what caused the trend and where it is likely to lead—and hope his conclusions are correct.

Science News Letter, July 7, 1945



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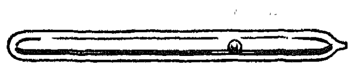

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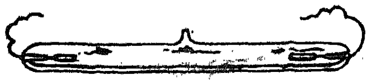

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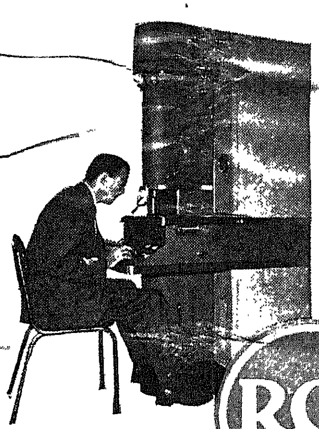

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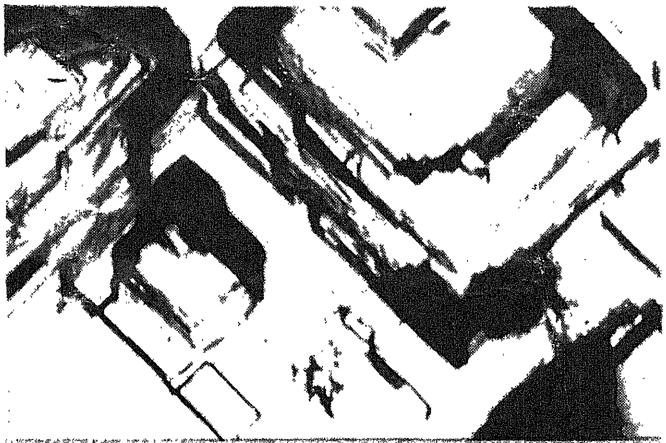
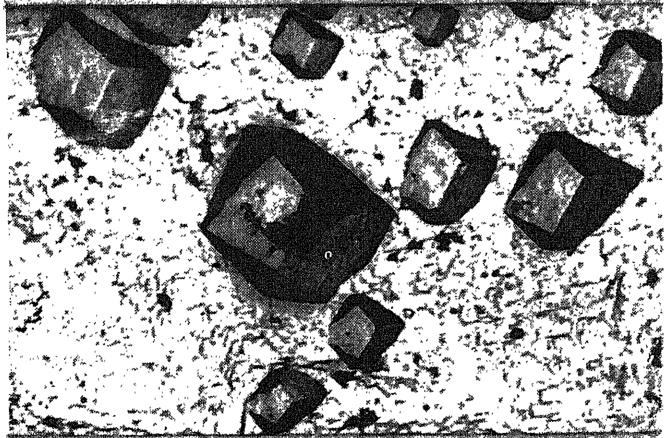


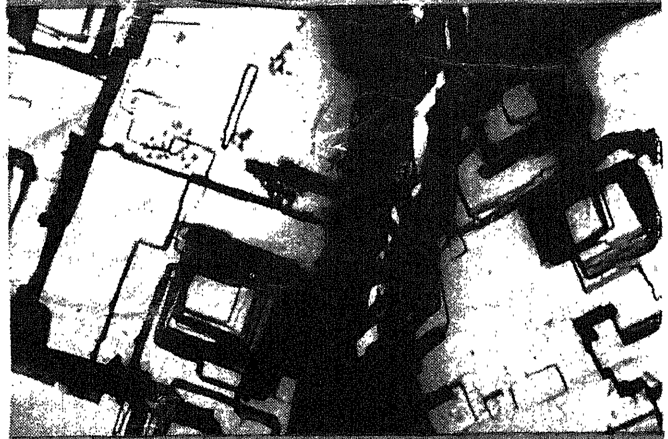
OXIDE FILM X 11,500

Cubic block structure within a single grain, in a deep-etched sample of an annealed aluminum alloy sheet.



OXIDE FILM X 5,000

Cubic etch pits, in a deep-etched sample of an annealed aluminum alloy sheet.



OXIDE FILM X 11,500

Cubic block structure adjacent to a grain boundary, in a deep-etched sample of an annealed aluminum alloy sheet.

• Books of the Week •

COMMON AILMENTS OF MAN—Morris Fishbein, ed.—*Garden City Pub. Co.*, 177 p., $1.

THE FLORA OF OAKLAND COUNTY, MICHIGAN: A Study in Physiographic Plant Ecology—Marjorie T. Bingham—*Cranbrook Inst. of Science*, 155 p., paper, illus., $1. Bulletin No. 22.

GENERAL BIOLOGY—Leslie A. Kenoyer and Henry N. Goddard—*Harper*, 653 p., illus., $4.50. Revised ed.

HANDBOOK OF PRACTICAL BACTERIOLOGY: A Guide to Bacteriological Laboratory Work—T. J. Mackie and J. E. McCartney—*Williams & Wilkins*, 720 p., $5. A William Wood book.

PRINCIPLES OF RADIO—Keith Henney—*Wiley*, 534 p., illus., $3.50. Fifth ed., revised and enlarged.

THE STORY OF A COUNTRY MEDICAL COLLEGE: A History of the Clinical School of Medicine and the Vermont Medical College—Frederick Clayton Waite—*Vermont Historical Soc.*, 213 p., $4.50, illus.

TECHNICAL DATA ON PLASTICS—*Plastics Materials Manufacturers' Assoc.*, 163 p., paper, $1.50. Spiral binding.

THE WAY OF AN INVESTIGATOR, A Scientist's Experiences in Medical Research—Walter Bradford Cannon—*Norton*, 229 p., $3.

YOUR NERVES, How to Release Emotional Tensions—Louis E. Bisch—*Funk*, 310 p., $2.50.

Science News Letter, July 7, 1945

A Scientist's Experiences
in Medical Research

THE WAY
OF AN
INVESTIGATOR

By Walter B. Cannon, M. D.

George Higginson Professor of
Physiology, Emeritus
Harvard University Medical School

Based on the varied experiences of a distinguished career, and written with the modesty of a man devoted to the ideals of his profession, *The Way of an Investigator* is both an autobiography and a vivid picture of the laboratory in which today's scientist carries on his researches.

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RADIO

Two Radio Stations Beamed On Japan from California

➤ TWO powerful radio stations on the coast of California, each housing three high-frequency transmitters, soon will be in complete operation, each with a new 200-kilowatt transmitter added to the two 50-kilowatt transmitters already in use. All six transmitters are beamed on Japan to carry to the people of the Nipponese empire the war information that they should have and can not get otherwise.

Only one other radio station in the world has such a powerful unit. These two California stations are operated for the Office of War Information, one by the Columbia, and the other by the National Broadcasting Company. Their programs ~~will reach all~~ parts of the world occupied by the Japanese, including the homeland, Manchuria, Korea, China and distant islands in the South Pacific. Six radio-voices may be on the air at one time, or the three transmitters in either station may carry the same program at the same time to forestall jamming by the enemy.

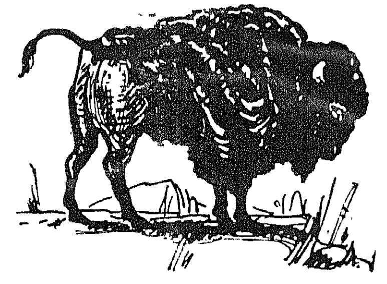
These new high-frequency stations are the results of cooperation ~~of engineers~~ of the OWI, two major broadcasting systems, the International Telephone and Telegraph Co., and the Federal Telephone and Radio Corporation. This latter company constructed the main units for a 200 kw high-frequency broadcast transmitter, two rectifier power supplies, modulators, cooling systems and the radio control panels.

Science News Letter, July 7, 1945

ZOOLOGY

NATURE RAMBLINGS

by Frank Thone



Untamable Animals

➤ INDIANS in several parts of the Americas—Mexico, Yucatan and Guatemala, Colombia, the Andean plateau—built up civilizations that in their material monuments at least were equal to those of ancient Egypt, Mesopotamia and India. But whereas the Old World peoples had plenty of beasts of burden, our Indians had to depend almost altogether

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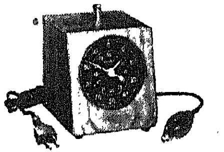

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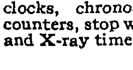

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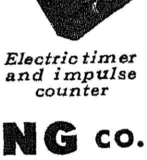

Electric timer and impulse counter

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on their own muscle power for transportation. The Old World peoples, even in prehistoric times, caught and tamed donkeys, horses, oxen, camels, elephants, water buffalo and—in the Far North—reindeer.

The only wild animal that was tamed and made a burden-bearer in any part of the Americas was the llama of the Andes. And even at best, the llama is a very poor kind of a work-animal. If you load more than about a hundred pounds on its back, it just lies down and will not budge until you take some of it off.

The Indians north of the Incas' realm didn't even have llamas. Some of the Plains tribes fashioned travoises for their dogs to drag during their migrations; but the burden a dog is capable of hauling by such primitive means would not be even as much as an elderly squaw could carry.

It has been a subject of speculation, sometimes, what might have happened had it ever occurred to the Sioux, or the Pawnees, or some of the other Plains tribes, to tame the bison or American buffalo. The most probable answer is, that it simply wouldn't have worked out. Although a fairly close cousin to our domestic cattle—so close, indeed, that the two can and frequently have been hybridized—the bison is less intelligent than the proverbially stupid ox, and a great deal more obstreperous. On the basis of what we know about its general nature, the bison would probably have to be considered untamable.

There is one good bit of collateral evidence in support of this opinion, in the fate of the European bison, or wisent. This animal, originally widely distributed over all of Europe and much of Asia, is zoologically very closely related to the American bison, and is very much like our bison in appearance and general character.

It was known to Old World peoples of great antiquity: its image appears on some of the earliest cylinder seals of Sumeria; and it was probably the original model of the great winged bulls, that guarded the entrances to Babylonian and Assyrian palaces, long after the peoples of Mesopotamia had exterminated it from that part of the world.

Now with the readiness that man has always shown everywhere to shift his burden from his own shoulders to those of an animal, if he can find a beast sufficiently docile to accept the load, it is unlikely that the wisent would have escaped captivity and domestication if it had been in the least amenable to such treatment. But it wasn't. To the very end (which probably came during the present war) the wisent continued to be a beast of the chase only. It could be hunted and killed, but not tamed. And so it was with our own American bison.

Science News Letter, July 7, 1945

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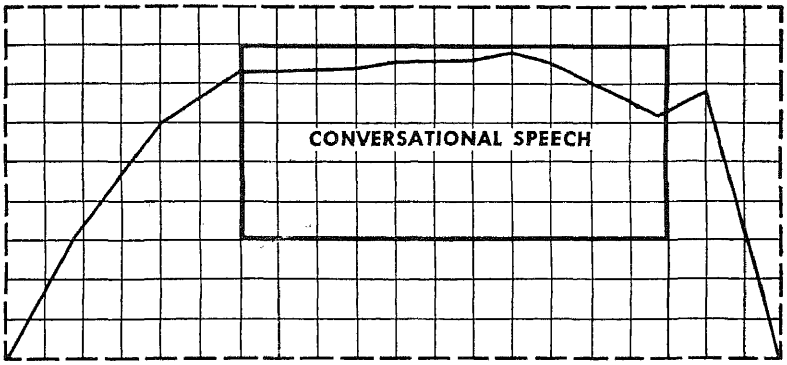
What Makes a Good Hearing Aid... No. 1 of a Series



FREQUENCY RESPONSE:

• To enable the hard of hearing to understand conversation, most hearing aids concentrate on sound amplification within the frequency range of average speech. But pitched higher and lower than that, are many of the tones and overtones that lend shading and color to sound.

The chart above shows how one make of hearing aid has attained a frequency response that means an appreciable gain in potential acuity for the hard of hearing. Note that the broad, plateau-like curve includes most of the area within which useful and enjoyable sounds fall. The level of this frequency response can be adjusted to the individual hearing loss of most users.

You will find that a hearing aid with a frequency response of this character gives better recognition of voices and keener enjoyment of radio, movies, and theater.

The Western Electric Hearing Aid is one hearing aid that has a frequency response like that shown in the chart.

THIS SERIES, BASED UPON RESEARCH CONDUCTED BY BELL TELEPHONE LABORATORIES, IS PUBLISHED IN THE INTEREST OF THE HARD OF HEARING AND THEIR PHYSICIANS. Western Electric Hearing Aids

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New Machines and Gadgets

⚙ *PORTABLE service station supplies high-pressure lubrication for farm trucks and tractors in the field. The small unit, mounted on two wheels, has gasoline power, and its own air compressor which will inflate tires as well as put grease and oil where needed.*

Science News Letter, July 7, 1945

⚙ *ELECTRIC MOTOR, explosion-proof, for use in rooms where the surrounding atmosphere is charged with ethyl ether vapor, is so enclosed in a metal casing that ignition of the vapor is prevented. It is built to meet the specifications of the Underwriters Laboratories, Inc., and carries its label.*

Science News Letter, July 7, 1945

⚙ *STRAIN-GAUGE, to measure stress-strains in metal construction in bridges, automobiles, aircraft and other structures, consists of short fine wire cemented to the material under test. Instruments, electronically operated, measure and record the electrical resistance in the wire, which varies with elongations and contractions.*

Science News Letter, July 7, 1945

⚙ *LIP MICROPHONE is fitted with an especially designed gland that will pass air but exclude water. If the wearer gets ducked in a beachhead landing, the microphone, shown in the picture, is unharmed by the water. Up to 25 minutes under 10 inches of sea water is safely withstood.*

Science News Letter, July 7, 1945

⚙ *FOURTH-OF-JULY pistol, made of plastics instead of metal, has few joints and therefore probably longer life than the usual toy gun. When the trigger is pulled, an inner metal spring strikes the side, making a "bang" somewhat like that of a real pistol.*

Science News Letter, July 7, 1945

⚙ *GAS-PROOF shirt has special flaps that fold up on themselves in the front opening, and others at the cuffs. They prevent the entrance of poisonous gases when closed and buttoned, forming a triple-ply closure when pulled together and fastened over the chest.*

Science News Letter, July 7, 1945

⚙ *REAR-VIEW device for automobiles is made of a series of connecting tubes extending from a position in the fore part of the car through the rear, with a mirror at each angle. A wide-angle lens on the rear gathers the view and projects it on a ground-glass screen in front of the driver.*

Science News Letter, July 7, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 266.*

Question Box

AERONAUTICS

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ASTRONOMY

What planet has been mistaken for a Jap balloon recently? p. 8.

CHEMISTRY

How may luminous paint be used in the operating room? p. 2.

COMMUNICATIONS

Where will the five new radiotelephone stations be located? p. 7.

ENTOMOLOGY

How can a million crickets per square mile be killed in one season? p. 4.

HERPETOLOGY

What additions to the Philadelphia Zoo have recently been received from England? p. 9.

MEDICINE

How successful has the search for a virus disease weapon been? p. 2.

What made the skin grafting operation on a hemophiliac possible? p. 3.

PHYSICS

What new refrigerator is proposed? p. 7.

PHYSIOLOGY

Who can see by "black light"? p. 2.

PLANT PHYSIOLOGY

What chemical has been found to speed the growth of plants? p. 8.

POPULATION

Why will the children of 1965 have a better chance of growing to maturity? p. 10.

SEISMOLOGY

Where were the recent twin earthquakes located? p. 6.

ZOOLOGY-TAXIDERMY

What is the scale of the miniature plastic animals at the Chicago Natural History Museum? p. 5.

Where published sources are used they are cited.

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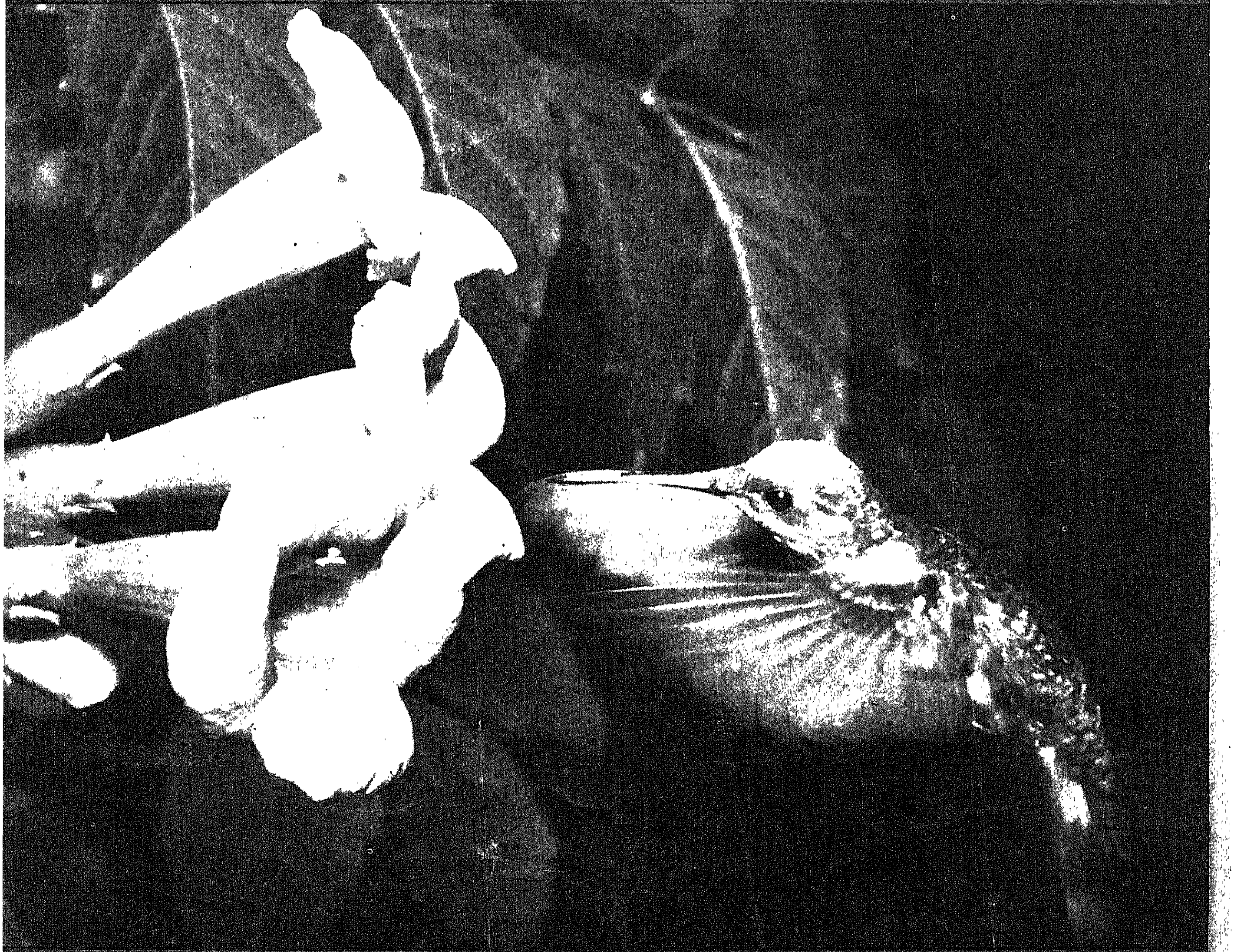
CIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • JULY 14, 1945



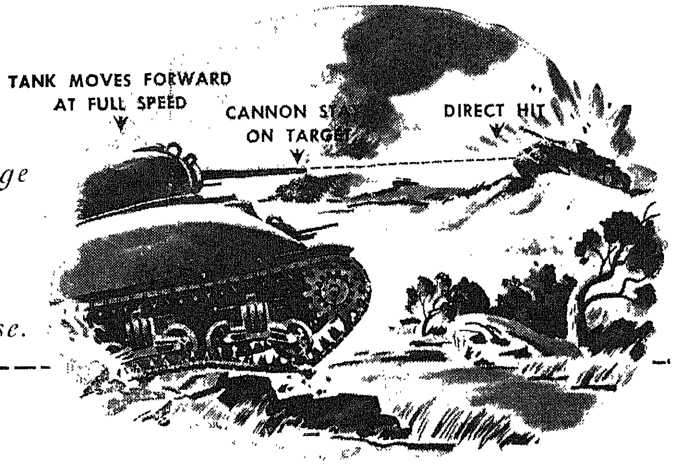
Agile Aerialist

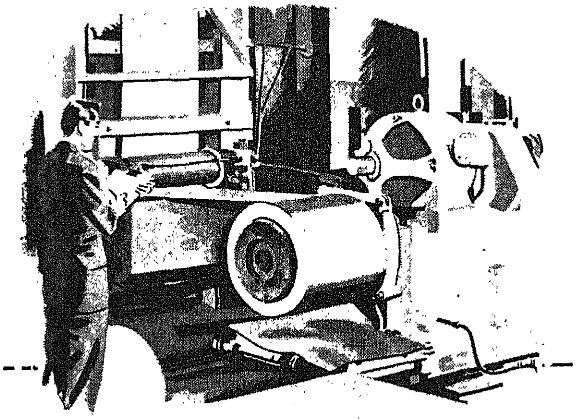
See Page 24

A SCIENCE SERVICE PUBLICATION

In an Army tank a GUNNER fires with deadly accuracy — while charging across rough terrain — because of a gun stabilizer, officially recognized as one *outstanding advantage* of our tanks over those of the enemy.

. . . *the name on the GUN STABILIZER is Westinghouse.*


TANK MOVES FORWARD AT FULL SPEED
CANNON ST ON TARGE
DIRECT HIT

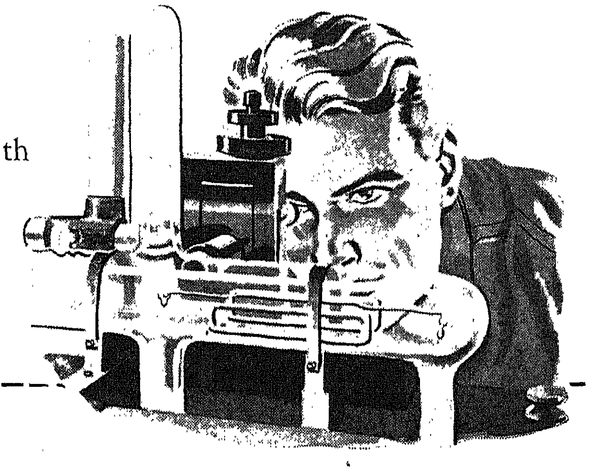


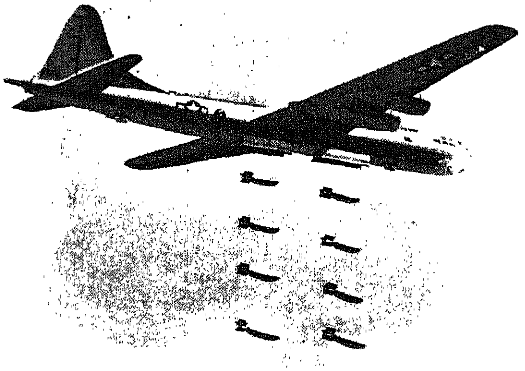
In a steel mill an ENGINEER uses an induction heater to fuse a mirror-like surface on dull electrolytic tin plate—helping to conserve *two-thirds* of our war-scarce tin supply.

. . . *the name on the INDUCTION HEATER is Westinghouse.*

In a laboratory a SCIENTIST uses a micro-balance to weigh a *single layer of oxygen atoms*—1/50,000,000th ounce — to determine the corrosion resistance of special alloys at high temperatures.

. . . *the name on the MICRO-BALANCE is Westinghouse.*





In a bomber a BOMBARDIER "pin-points" his target with an American bombsight — controlled by a gyroscope which is driven by an electric motor, balanced to *1/10,000th ounce.*

. . . *the name on the ELECTRIC MOTOR is Westinghouse.*

TODAY — Westinghouse is producing vital war equipment and weapons, many of which must remain secret until after final Victory.

TOMORROW — These wartime developments will be turned to peaceful uses — products for industry and the home, backed by Westinghouse research, engineering, and precision manufacture.

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PHYSIOLOGY

Answer to Muscle Riddle

The question of how living muscles contract and relax subject of research by Hungarian Nobelist during Nazi persecution.

By MAXIM BING, M.D.

➤ THE QUESTION of how living muscles contract and relax seems to have been answered by research by Prof. A. de Szent-Gyorgyi of Hungary, winner of the Nobel Prize for his isolation of vitamin C.

The muscle research, finished by Prof. de Szent-Gyorgyi during severe persecution by German and Hungarian Nazis, was reported in full at a meeting of the Hungarian Society for Natural Sciences, the first public act of scientific life after Hungary's liberation.

Discovery of a previously unknown protein and its role in muscle contraction were reported by Prof. de Szent-Gyorgyi. He and his collaborator, Bruno Staub, named this protein actin.

Under certain conditions, actin forms filaments consisting of globular particles arranged in a string like the beads of a rosary. These actin filaments or strings of beads unite with another previously discovered muscle protein, myosin. Rod-shaped particles of myosin cling together side by side and at their ends adhere to the globules of the actin string.

When a potassium salt is added, the myosin is precipitated. The consequent shrinkage bends the actin string toward the side of the shrinking myosin. The shortening which follows is seen as muscle contraction.

The myosin particles are attached to the actin string in a spiral pattern which much resembles a winding staircase, the actin particles forming its axis and the myosin particles its steps. Through muscular contraction, the complete system assumes the shape of a corkscrew.

The cross-striation of voluntary muscles of the body is due to this spiral arrangement of the clusters of myosin-actin systems of which the muscle fibers are composed, Prof. de Szent-Gyorgyi reports.

This has been proved by rotating the muscular fibrils under the microscope. During such rotation, the cross striation moves along the axis of the fiber. This explains the difference between cross-striated muscle, such as that in the arms, and smooth muscle such as that of the heart. Inside smooth muscle, the actin-myosin systems are less closely packed and thus neighboring actin-myosin spirals differ in their phases.

The three known conditions of muscles, relaxation, contraction and rigor mortis (the stiffness of the muscle shortly after death), are accounted for by Prof. de Szent-Gyorgyi's findings. Like myosin, actomyosin is precipitated by potassium chloride. If this reaction is performed in the presence of another chemical, adenosintriphosphate, the actomyosin not only precipitates but contracts.

This precipitation and contraction is limited to a very narrow range of salt concentration, outside of which the actomyosin splits into actin and myosin. Furthermore, the range of concentration depends also on the adenosintriphosphate concentration. Very slight variations of either cause a transition of the dissociated (relaxed) system into the contracted one.

Relaxation of muscles corresponds to the dissociated actin-myosin system. Contraction of muscles corresponds to the associated one, while rigor mortis corresponds to the salt precipitation of actomyosin through decomposition in the absence of adenosintriphosphate.

Actin was discovered during investigation of what happened during a mistake, as scientists considered it, in extracting myosin from muscles.

The consistency of myosin differs considerably according to the duration of the process of extracting it. Short extraction yields a thin fluid. Prolonged extraction produces a jelly. Previous researchers usually discarded the jelly-like product, believing it to be the result of having "spoiled" the process of extraction.

Prof. de Szent-Gyorgyi, however, prepared filaments from the jelly-like product and immersed them in a muscle "soup," that is, a boiled extract of muscle tissue. The filaments from the "spoiled" extraction contracted vigorously. Prof. de Szent-Gyorgyi thus reproduced the vital function of muscle in the test tube and made it accessible for analysis.

Prof. de Szent-Gyorgyi

Prof. de Szent-Gyorgyi's results seem to open new vistas for explaining the nature of wave excitation and the mechanism of neural action. They represent a new approach to one of the oldest and most important problems of biology. He has been invited by the Soviet government to give a number of lectures in Moscow about his fundamental researches.

Science News Letter, July 14, 1945

VOLCANOLOGY—AERONAUTICS

Army Helicopter to Hover Over Mexican Volcano

➤ A U. S. Army Sikorsky helicopter will shortly hover over Paricutin volcano in order to discover for the joint Mexican-U. S. volcano commission secrets of this geological wonder that burst forth from a cornfield two and a half years ago.

In this scientific exploration the Army's Air Technical Service Command will study performance of the latest model R6A helicopter under conditions of high altitude, turbulence and temperature similar to those in the Pacific war theater which do not exist anywhere in the United States. While making the scientific flights, Capt. George D. Colchagoff and Flight Officer Roy P. Beer, with 200 hours of helicopter experience, will be investigating rescue, observation, supply and liaison uses of the helicopter.

The first helicopter to be used in scientific collaboration with any country has arrived in Mexico dismantled in a C47 Army transport so snugly packed that only one inch space remained. The

Imperial Agricultural Research Institute

helicopter is being assembled and flown to a base three miles from the volcano in full view of the cone.

Igor Sikorsky, designer of the helicopter, will participate in the double-barrelled helicopter volcanological observations. Geological work will be directed by Dr. L. C. Graton of Harvard and Dr. Ezequiel Ordonez, Mexican geologist, while Dr. O. H. Gish of the Carnegie Institution of Washington is in Mexico to study the electrical phenomena of the volcano which results in lightning-like discharges with accompanying thunder within the erupting material.

From the leisurely hovering helicopter the scientists expect to look down the throat of erupting Paricutin to discover what happens there, accomplishing in a half hour what ordinarily takes days.

Science News Letter, July 14, 1945

MEDICINE

Neostigmine for Polio

Has been found disappointing in acute cases, but two medical groups believe it should get further trial. Recovery said to depend on nervous system damage.

WITH the infantile paralysis season at hand, physicians will read in the *Journal of the American Medical Association* (July 7), that:

1. A synthetic chemical called neostigmine plus hot packs help relax muscle spasm a little, or temporarily, in acute cases and are promising enough to warrant further trial and study.

2. The amount of ultimate recovery from infantile paralysis depends primarily on the extent to which the central nervous system was involved and not the type of treatment.

Studies of neostigmine treatment are reported by two medical groups: Drs. Henry Brainerd, Hilliard J. Katz, Albert Porter Rowe, Jr., and J. C. Geiger, of San Francisco, and Drs. M. J. Fox and W. H. Spankus, of Milwaukee.

The point about recovery depending on amount of nervous system involvement is made by Dr. Mary S. Sherman, of Chicago.

The use of neostigmine for infantile paralysis was first suggested by Dr. Herman Kabat, now with the U. S. Public Health Service, and Dr. Miland E. Knapp, of the University of Minnesota, in 1943. They reported the chemical relieved the excessive muscle tone or tension and the muscle spasm and helped reduce incoordination. Neostigmine, also called prostigmine, had heretofore been used successfully to relieve fatigued muscles in myasthenia gravis, a disease of muscle weakness.

The San Francisco group reports from their studies that neostigmine relaxes muscle spasm at least temporarily, that its value requires further proof but that its further use is "definitely warranted" under controlled conditions.

"The Kenny treatment with or without neostigmine is an effective method of preventing contracture and deformity," they also report, adding they found neither proof nor disproof that either neostigmine or Kenny packs reduced the incidence of paralysis.

The Milwaukee doctors were disappointed at finding no pronounced or even consistent relaxation produced by neostigmine. They felt their results differed from those of Drs. Kabat and Knapp because all the Milwaukee cases were acute, whereas chronic cases predominated in the group treated by Drs. Kabat and Knapp. Using neostigmine with hot fomentations, the Milwaukee doctors believed a persistent and perceptible relaxation of spastic muscles resulted in most cases and that this treatment should be used further.

The condition of 70 patients stricken by paralysis in 1943 and examined 18 months later is the basis for Dr. Sherman's report. These patients were not treated with Kenny packs, splints or special apparatus. They were kept at absolute rest in bed and given as nearly normal a diet as possible. As soon as the pain and fever subsided, physical activity with early active exercise under water was started. The patients were got up and encouraged in the normal use of their legs and arms as soon as possible.

Of the 64 survivors, 13 had no detectable weakness at any time, 44 had some muscle weakness but are not now handicapped, six have "functionally significant weakness," but require no further treatment, and seven require braces or operations. No patient has gotten worse during the 18 months and major improvements, as expected, have occurred without exception in those patients who were not completely paralyzed.

Science News Letter, July 14, 1945

Bauxite deposits in Oregon are the only known commercial reserves of this material for making aluminum in the United States west of the Rockies.

Horse serums are used for the production of antitoxins because they are more easily borne by the human organism in large quantities than those of most other animals.

SCIENCE NEWS LETTER

Vol. 48 **JULY 14, 1945** *No. 2*

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MEDICINE

Trench Mouth Remedy

Penicillin brings speedy recovery from this disease. Pain and other symptoms completely banished in 48 hours in the first 14 patients treated.

➤ PENICILLIN can bring speedy recovery from Vincent's angina, popularly known as trench mouth, it appears from two reports in the *Journal of the American Medical Association* (July 7).

Decided improvement in four to six hours, with pain and other symptoms completely banished in 48 hours, was achieved in the first 14 patients treated by Capt. Bernard M. Schwartz, Army Medical Corps, at the A.A.F. Regional Hospital at Truax Field, Madison, Wis. Altogether Capt. Schwartz has now treated 41 patients with similarly good results. He recommends giving the penicillin by hypodermic injection into the muscles in 20,000 unit doses every three hours until 100,000 units have been given.

Results with intramuscular injections were "so dramatic" that this method, giving 25,000 units of penicillin for four doses at three-hour intervals, is called "apparently the optimal treatment of Vincent's angina" by Maj. Paul L. Shallenberger, Lt. Col. Earl R. Denny and Maj. Harold D. Pyle, Army Medical Corps, in the second report.

Before trying the injections of penicillin, these medical officers had treated trench mouth patients at Gardiner General Hospital by swabbing a solution of the mold chemical directly onto the sore, ulcerated places in the patient's mouth. In these patients the ulcers showed marked improvement in 24 to 48 hours and pain in those who were suffering severely was rapidly relieved.

Comparing the results of penicillin treatment with other methods, including sulfadiazine lozenges, Maj. Shallenberger and associates found that the germs causing the trouble disappeared in 3.7 days, on the average, in the penicillin-treated group. The average time for this was 7.1 days in the group getting sulfadiazine lozenges and 8.8 days in the group treated with the standard trench mouth medicines, sodium perborate and hydrogen peroxide, chromic acid and silver nitrate, and oxophenarsine hydrochloride.

The most rapid response, however, came in a patient who was given 15,000 units of penicillin injected into the muscles every three hours for eight doses. Pain disappeared in six hours and the germs could not be found after 11 hours.

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ENGINEERING

Good for 100,000 Miles

Automobile tires that are practically blowout-proof and with non-skid qualities are expected. Progress toward these objectives is promising.

➤ AUTOMOBILE tires that will run 100,000 miles, practically blowout-proof and with greater non-skid qualities, are ultimately expected, declared John W. Thomas, directing head of the Firestone Tire and Rubber Company, in discussing the new $2,000,000 Firestone research laboratory.

"No one can estimate accurately how long it will be before such tires are on the market," he said, "but there is little question that through the limitless capacities of research these objectives may be achieved."

"A tire that would run 3,500 miles was the goal of the rubber industry several decades ago," Mr. Thomas stated. "Now it's not unusual for passenger car tires to run ten times that far and it is no trade secret that we ultimately expect to produce a tire that will run 100,000 miles.

"We know how to make blowout-proof tires," he added, "and we are making progress on the development of tires that are puncture-proof and have greater non-skid qualities."

The new laboratory was designed and constructed under the direction of Mr. Thomas who was the company's first chemist. It will be devoted entirely to research. It will serve as the focal point of the company's extensive program for the development of new products and the improvement of those now in use.

The building is a three-story brick structure, air-conditioned, and containing approximately 100,000 square feet of floor space. It has prefabricated steel inner partitions which can be moved to completely rearrange the interior as desired. It is equipped with modern facilities and with the latest scientific apparatus, including an electron-microscope that magnifies up to 100,000 times compared with 2,000 for more ordinary microscopes.

Among the special equipment are a forced vibrator to determine properties of rubber in motion; a plastometer to measure processibility of rubbers and rubber-like materials, and a relaxometer to study the effects of heat and oxygen on stretched rubber.

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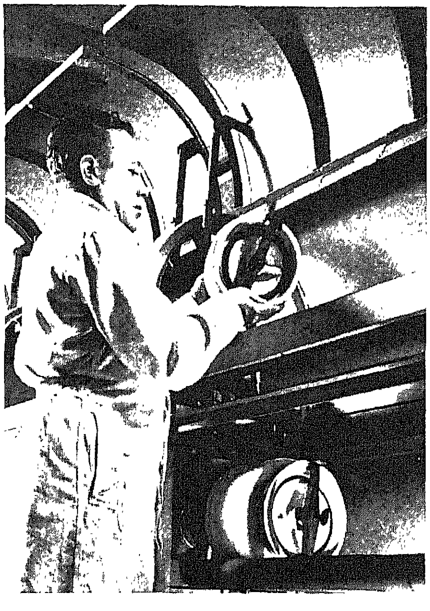

TOUGH TIRES—Chemicals used in compounding rubber are ground and mixed in this ball mill at the Firestone Tire and Rubber Company's research laboratory. The chemicals (also called compounds or pigments) are ground up by the stones as the jars turn on rubber rollers in the mill.

Wood and wood products are still on the war critical list because of the unprecedented demand for lumber, pulpwood, plywood and other materials.

During one season, an active *bee colony,* gathering about 65 pounds of pollen, will have visited and provided free pollination for roughly a half-billion flowers.

ASTRONOMY

"Hidden" Stars Studied

Astronomers have found a way of getting beyond the blaze of light of some of the hottest stars to study the hidden light of their cooler companion.

➤ ASTRONOMERS have found a way of getting through the blaze of light of some of the biggest and hottest stars in the universe to tune in on the hitherto hidden light of their cooler companion stars.

Even though the fiery companion may be much hotter than its cooler brother star, it is possible to distinguish between the two stars and estimate the size and distance of the cooler companion by means of the star's infrared light, invisible to the naked eye.

In the infrared part of the spectrum the light of the "hidden" star overwhelmingly predominates and tells its own story without interference from its white-hot companion, Dr. P. C. Keenan of the Yerkes Observatory of the University of Chicago and Dr. J. A. Hynek of the Perkins Observatory of Ohio Wesleyan University and Ohio State University, both now doing war research, report. (*Astrophysical Journal,* May.)

Ability to determine the distances and sizes of the cooler stars from the relative intensities of selected lines in the infrared spectrum resulted from the development of more efficient spectrographs and of photographic plates much more sensitive to infrared light. The recently-installed infrared spectograph attached to the 69-inch reflector, the fifth largest telescope in the world, of the Perkins Observatory, was used in studying the stars.

The new method proved particularly effective in the case of stars whose temperature ranged from about 4,000 to 7,000 degrees Fahrenheit, which are particularly rich in light to which ordinary photographic plates are not sensitive.

Astronomers can now estimate the distance of these stars simply by examining the infrared spectrum. In the past much could be told about the hotter stars from the ordinary visible region of the spectrum, but the infrared end was not examined separately.

One of the double stars studied by means of its infrared spectrum was the famous eclipsing pair, VV Cephei, the red component of which is one of the largest stars known. Peculiarities which cannot be detected by visible light were revealed—the ultraviolet light of the hot companion acting on the "red" star excites spectral lines which are entirely foreign to a normal cool star. These lines can be used as sensitive indicators of the relative physical condition of the two whirling components.

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PHYSICS

Fantastic Nazi Claim

German report of a stratosphere platform that would float 5,000 miles above the earth seems tall story when analyzed. Still plenty of gravity at that height.

➤ WHEN German scientists are reported to have been working on a "master secret weapon consisting of stratosphere platforms to float 5,000 miles above the earth from which death rays could be focused on any part of the world," Jules Verne must have stirred uneasily in his grave.

For this tall tale, relayed from an Army press conference in Paris, is by no stretch of the imagination in the same class with the very real and technically effective V-1 and V-2 German bombs and rockets. Even Verne's fantasies, many of which were materialized in a sense by scientists of later generations, were at least plausible by the scientific knowledge of his day.

Putting anything 5,000 miles above the earth and making it stay there would be difficult. The effect of gravity by no means disappears at that height. A 150-pound man would weigh 30 pounds at that distance from the center of the earth because gravity varies with the square of the distance. (The earth's surface is about 4,000 miles from the earth's center, so you can figure this for yourself.)

It would take a lot of energy to be supplied to jet or rocket devices just to keep any sort of structure at that distance above the earth, to say nothing of getting it there in the first place. Balloons and propellers would not do in that airless region.

With the practical development of some kind of subatomic energy, which has long been a dream, it might be possible to have enough energy in sufficiently small weight to solve the problems involved, but who knows whether the energy of the atom will ever be tapped?

Supplying oxygen to the human beings to man the platforms would be somewhat like supplying the pilots who fly at high altitudes. This would not be impossible, although the supply problem of transporting the necessary oxygen from the earth's surface, even if some regeneration method were used, would not be a simple one.

At such heights beyond the protecting ozone that cuts off much of the sun's ultraviolet radiation, any unscreened human would indeed find the sun's rays death rays. But protecting the crew against the sun's rays would not be insurmountable.

As for the giant sodium mirrors supposed to be placed on these platforms for collecting and focusing the sun's rays, they would not be as formidable weapons as the Schrecklichkeit imaginations of the German scientists would imply. (Why complicate the design by suggesting mirrors of sodium, a metal that in air or moisture bursts into flame spontaneously? Aluminum would do quite well.) As in all burning-glass devices, the light collected would need to be concentrated upon a much smaller area than the collecting surfaces. If the mirrors on high were two or three square miles in area, they could not do as much damage as a few B-29 loads of incendiaries.

Evidently there are still grandiose ideas among the Nazis questioned or our Army investigators got hold of some party leaders more fantastically indoctrinated than scientific. There may be some interesting and useful researches that the Germans had underway, but the chances are they will be closer to earth than this one.

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The *banana* is the largest of all plants that do not have a woody stem above ground; the true stem of the banana is below ground, and the part above is a leaf sheath and is called the "false stem."

PUBLIC HEALTH

Plasma for Civilians

The Red Cross will continue to operate the blood donor service which has successfully supplied blood, plasma and albumin to the armed forces.

➤ ONE ANSWER to the question of where to get blood and blood plasma for civilians now and in the postwar world is given in a new policy announced by the American Red Cross.

The Red Cross will continue to operate for civilians the blood donor service which has been so successful in supplying blood, plasma and albumin to the armed forces.

Victims of accidents and burns, mothers in childbirth and other patients desperately needing blood or one of its fractions will not, as in prewar days, have to depend on finding a relative, friend or professional donor with the right blood type. Doctors who have learned through their war experience to use blood and plasma liberally will not be hampered in their lifesaving efforts by lack of supplies of the vital fluid.

Details of the new Red Cross service are given in a report in the *Journal of the American Medical Association* (July 7).

Red Cross chapters will be authorized to set up blood donor centers in communities requesting it. The centers will be operated in cooperation with a sponsoring health or medical agency which meets standards specified by the Red Cross. Such an agency might be a health department or a medical society. This agency would be responsible for technical operations, staff and equipment.

No charge may be made to patients, hospitals, clinics or physicians for the blood or blood derivatives. Costs of donor recruitment, operating costs and costs of processing the blood must be paid by some other means than charging the patient, doctor, hospital or clinic for the blood. In Michigan, the state is financing such a program and other states have appropriated money for this purpose.

The Red Cross will take part only in a blood donor program that services the entire community. Blood given by members of the community to the Red Cross must be freely available to anyone in the community needing it, seems to be the idea here.

If a community is serving as a source of blood for the Army and Navy, the Red Cross will not cooperate in a civilian service unless the amount of blood required for civilians can be obtained over and above the needs of the armed forces.

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AERONAUTICS

Giant Clipper Capable of Five Miles a Minute

➤ A GIANT Clipper capable of cruising at five miles a minute and carrying 204 passengers will provide worldwide air service in postwar days within the means of the average man, it is announced by Pan American World Airways. It is the largest of four new clippers for which plans are completed which are designed to meet future requirements of international high-speed air transportation.

This largest Clipper is the Consolidated-Vultee six-engined CV-37, Clipper 11. It will carry a payload of slightly less than 50,000 pounds, made up of 204 passengers and 14,000 pounds of baggage, mail and express. With a speed of 340 miles per hour, it will be able to fly from New York to London in about nine hours. It will be pressurized and air-conditioned for operation at an altitude of 25,000 feet.

A double-decked Lockheed four-engined L-89, Clipper 10, will carry 128 passengers and a crew of 11 at 300 miles an hour with a range of 2,300 miles Clipper 9 is a Douglas four-engined DC-7 which will carry 108 passengers at 300 miles an hour and will have a range of over 2,500 miles. Clipper 8 is a four-engined Lockheed Constellation for express schedules on medium-range routes of over 1,500 miles. Its speed is 300 miles per hour and its capacity 56 passengers.

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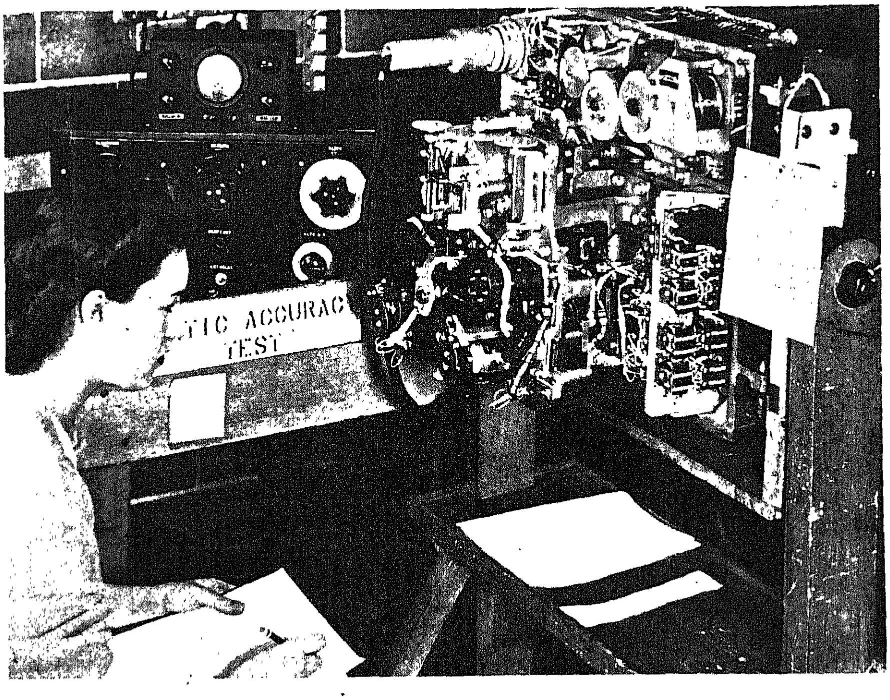

"BRAIN TEST"—The General Electric computor for accurate gunfire in the B-29 bombers is given an accuracy test. Inputs of range, elevation and azimuth, gun position, altitude, airspeed, and air temperature are introduced into the computor. Outputs consisting of elevation and azimuth correction angles are checked against calculated output data. Installed on a B-29, the computor automatically calculates with split-second precision the parallax, windage, gravity drop, and lead corrections and adds them into a total correction. Result is that the turrets are "fooled" into pointing their guns so that bullets and target arrive at the same point at the same time.

CHEMISTRY

Super-DDT Discovered, But Not Yet Available

➤ A SUPER-DDT, a synthetic compound even deadlier to insects than the original DDT, has been discovered by British chemists. It is known by the convenience-name of Gammexane, and is sometimes referred to by the Apocalyptic number 666. Its exact chemical designation is the gamma isomer of benzene hexachloride.

It is not particularly closely related to DDT in its structural chemistry, but it seems to be even more of a knockout so far as insects are concerned. By a curious coincidence, its history is like that of DDT in that its existence had been known for a long time, but its insecticidal properties had not been suspected until it was tried out relatively recently. Then it was discovered to be the deadliest weevil poison that the British firm's chemists had ever tested, and it would kill flies in half the concentration required in a DDT solution. It was also proven to be deadlier than DDT to *Aedes egypti,* the mosquito that carries yellow fever.

There are, however, some points about Gammexane that have not yet been cleared up. It is not known, for example, if it is as persistent under conditions of ordinary use as DDT, which is known to remain toxic to insects for months. Lime, which is used a great deal in agricultural sprays and dusts, is known to be destructive to Gammexane; how to obviate this difficulty has yet to be worked out.

Gammexane is not yet commercially available in the United States, but presumably will eventually appear in the market here.

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PUBLIC HEALTH

Increase in Polio Cases Not Cause for Alarm

➤ AN INCREASE in infantile paralysis cases throughout the nation was reported to the U. S. Public Health Service for the week ending June 30. The total was 155, with reports not yet received from Mississippi and Rhode Island, which reported one and no cases respectively the previous week. The total for the week of June 23 was 116.

Authorities, however, see no cause for alarm and no signs yet of an epidemic. At this time last year, they point out, the number of cases was increasing sharply. For the last week in June the total was 220.

Last year's epidemic did not fall off as abruptly or to as low a level as would be expected. Consequently during the early part of this year more than the usual number of cases were being reported. As the season for infantile paralysis approaches, the difference between the number of cases reported weekly this year and last year is increasing.

The greatest number of cases reported by any one state is 54 from Texas. Next highest figure is 16 from New York.

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ENGINEERING

Giant Sealed Tanks Now Transport Flour

➤ FLOUR for bakeries is now transported from mills in bulk, in giant sealed tanks mounted on flat railroad cars, three to a car. The tanks are filled and emptied through pipelines by air pressure without other handling. Greater economy in handling and transportation is one result of the new method, but more important is greater sanitation. Moisture, dust and vermin cannot get into the flour during loading, on the road in the sealed tanks, or in unloading. The method will probably come into wide use in postwar days for baking establishments that buy flour in 25,000-pound lots.

The new system is a development of the National Fitch Corporation, which functions as a research and sales division for specialized railroad equipment. Together with the tank is a one-man conveyor mechanism for transferring the tank to a truck-trailer for transportation to bakeries that do not have railroad sidings. The unloading equipment is made by the Fuller Company of Catasauqua, Pa., which manufactures suction devices for handling grain and granulated products. It draws the flour directly into the receiving bins in the bakery.

When the tank of flour has to be transferred to a truck, a special conveyor platform is mounted on the trailer that works in conjunction with a similar conveyor under the tank on the car. A special 110-volt direct current generator, mounted on the truck and powered by the truck's engine, furnishes the electricity to operate the conveyor motor. The truck is parked parallel to the car, connecting hooks put in place, the generator started, a button pushed, the motor turns and the tank is transferred in 90 seconds.

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IN SCIEN

ORNITHOLOGY

Hummingbird Makes 75 Wing Strokes Each Second

See Front Cover

➤ THE HUMMINGBIRD is the incredible member of the bird group. This smallest of birds is able to move its wings so rapidly that a distinct hum is heard when it flies. It has been estimated that the ruby-throated hummingbird, shown on the front cover of this Science News Letter, makes about 75 wing strokes each second while it is flying. It is the only bird that is able to fly in reverse. It feeds on flower nectar and small insects. When it approaches a flower for nectar, it is able to hover in front of a blossom while it uses its needle-like beak and long tongue to reach the bottom of the flower. When it wishes to leave, it flies backward until the way is clear for forward flight. The photograph was taken by George A. Smith of Quarryville, Pa., at .001 a second.

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CARTOGRAPHY

Russians Made Map of Berlin While Besieged

➤ RUSSIAN cartographers in Leningrad prepared maps of Berlin while their own city was closely besieged by the Nazi army and German shells were bursting near the office where they worked. The story, illustrating the confidence with which the Red Army looked forward to victory even when the tide of war seemed to be running overwhelmingly against them, is related in the official *Information Bulletin* issued by the Embassy of the USSR in Washington, D. C.

Hungry and cold, the cartographers, draftsmen, engravers and printers got a great lift out of sealed orders received from the Supreme Command to draw up and print a new map in preparation for the eventual siege of Berlin. They got together all existing maps of the enemy capital they could find in Leningrad, and collated these with new data brought in by the Red Army's reconnaissance. When the break finally came, and the Russian forces surged westward, every officer had in his map case a new and accurate plan of the city they were to destroy and then occupy.

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E FIELDS

CHEMISTRY

Nobelist Hevesy Returns Safely to Freed Denmark

➤ ONLY a day after his safe return to liberated Denmark from his war refuge in Sweden, Prof. Georg von Hevesy, winner of the Nobel chemistry prize last fall, fell and broke his ankle, an accident that confined him to Copenhagen's famous Finsen Institute.

Danes during the German occupation were not given the opportunity of knowing that one of their countrymen by adoption had won the high honor of the Nobel prize. Nazi censorship suppressed the news. Prof. Hevesy is a Hungarian of Jewish blood and his safety was threatened to such an extent that in October, 1943, when the persecution of Jews by the Nazis reached its climax in Copenhagen, both he and Prof. Niels Bohr, head of the Institute of Theoretical Physics, fled to Sweden.

Prof. Hevesy, who is a professor at Bohr's Institute, won the Nobel prize as the result of his work on the use of "tagged atoms" or isotopes in studying chemical and physiological processes. He once drank some water containing heavy hydrogen when it was not known whether or not this rare kind of the lightest element was poisonous.

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AGRICULTURE

U. S. Will Grow Turkish Tobacco This Summer

➤ TURKISH tobacco, which is skillfully blended with domestic tobaccos in making American cigarettes, will be grown on 55 small farms in North Carolina, Virginia and South Carolina this summer, following demonstration by scientists of Duke University and the agricultural experiment stations of these states.

Hitherto it has generally been considered impossible to grow the diminutive aromatic leaf in the United States. From 50 to 75 million pounds of Turkish tobacco are imported each year for blending with domestic varieties.

Cultivation of the Turkish tobacco in the test plots is hoped to determine experimentally whether a high quality product can be grown profitably. A large amount of hand labor is involved in both growing and curing the Turkish variety. The leaves are more numerous, but are only a tenth the size of domestic tobacco leaves, and require considerable handling.

The Turkish plant thrives and produces best quality leaves on comparatively poor soil, so the areas where it is likely to be grown do not overlap those where the domestic leaf is cultivated.

The Turkish leaf brings a substantially higher price per pound than does the domestic leaf, but more hand-labor is involved. It has been shown that from 700 to 900 pounds of excellent Turkish leaves can be grown per acre.

The research program, underway for the last five years, has demonstrated that fresh seed need not be imported from the European growing regions each year. It had previously been thought that seed grown in the United States would not continue to produce plants which are true to type.

Turkish plants are placed close together, the closely spaced stalks producing a large number of small leaves. There are 55,000 to 60,000 Turkish plants per acre as compared to 5,000 to 6,000 domestic plants per acre. For six to nine primings, at intervals of five to nine days, are required to remove all leaves from the stalk.

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LIMNOLOGY

Research Institute for America's Inland Seas

➤ ORGANIZATION of a new Great Lakes Research Institute, which will undertake to do for North America's five inland freshwater seas what is being done for the oceans by such laboratories as the Scripps Institution of Oceanography on the Pacific Coast and the Woods Hole Oceanographic Institution on the Atlantic, is announced in *Science* (June 29), by the Board of Regents of the University of Michigan.

The waters themselves, the rocky basins that contain them, their currents and other physical properties, and the animal and plant life forms that inhabit them, will be studied by a group of scientists trained in these special fields. Not all the investigators will be recruited from the University of Michigan; qualified men and women will be invited to participate in the research program wherever they may be found. Chairman of the new Institute is Prof. Paul S. Welch, limnologist.

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GENERAL SCIENCE

National Research Council Will List Laboratories

➤ INDUSTRIAL research laboratories of the nation are being listed by the National Research Council and new laboratories, especially, are being asked to provide information for this purpose.

Continuing a registry that showed 2,264 laboratories in existence in 1940, the new directory will include laboratories that improve products or reduce manufacturing cost as well as conduct fundamental and applied research.

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AGRICULTURE

Leaf Rust Disease Very Destructive This Year

➤ WHEATFIELDS in Oklahoma and Texas are taking a terrific beating from leaf rust disease, reports Dr. K. Starr Chester of Oklahoma Agricultural and Mechanical College, speaking on behalf of the American Phytopathological Society. This fungus, which is distinct from the species that causes black stem rust of grains, survived a mild winter and turned up on winter-wheat leaves 17,000 times more abundant this year than it was in the light rust season of 1944. Many thousands of acres of wheat in the Southwest have been given up as lost by the farmers; they have cut what is left for hay or plowed it under in preparation for a summer crop.

Dr. Chester fears that the rust spores, swept northward and eastward by summer winds, may spread disaster in the great grain areas still unaffected. His view, however, is not shared by scientists of the U. S. Department of Agriculture. They point out that the principal winter-wheat areas from Kansas northward are already well headed and approaching the ripening state. The long, cool temperatures have also slowed the growth of winter wheat to some extent, nevertheless the wheat has kept ahead of the fungi and seems now to be in fair position to finish several lengths ahead in the race.

It is still too early to state what may be the effects of a spread of leaf rust on spring wheat. However, in the main spring-wheat areas the varieties sown this year are resistant to known strains of both leaf-rust and stem-rust fungi.

Recent field surveys indicate also that infestation with wheat scab, another much-feared grain disease, is relatively light, at least in the central wheat area.

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CHEMISTRY

Oil, Mother of Chemicals

Better cosmetics, plastics, insecticides, and automobiles will result from advances recently made in the petroleum industry.

By MARTHA G. MORROW

➤ YOU WILL probably be able to get more mileage from your gas after the war; keep your home more nearly free of flies, mosquitoes and other pests; have a brighter, shinier car; and find your bread fresher in its waxed container because of advances recently made in the petroleum industry.

Better lipstick and face creams for the ladies, storm coats and fishing boots for the men, may also result from war-inspired developments in gasoline byproducts, as well as more effective girdles for stout beauties, hotter "canned heat" for cooking hamburgers on picnics, and more efficient explosives for clearing farm lands and for building roads.

Already the Allies are benefitting from 100-octane gasoline, which enables a plane to fly farther on a given quantity of fuel, or to carry a heavier load, or to travel faster. Oils have been developed which will flow about as freely when the plane is in the stratosphere where the surrounding temperature is 60 degrees below zero as when the plane is just taking off from the desert with its air sizzling around 110.

Special war weapons such as the new oil incendiary bomb which has been causing so much damage in Japan's chief cities, the improved flamethrower which is credited with shooting around corners, and the smoke generator which quickly hides ships and factories from the airborne enemy, all have the petroleum industry to thank for part of their newfound effectiveness.

Flaming Jellied Gasoline

The flamethrower which has been so successful in routing Japs out of pillboxes spits out jets of flaming jellied gasoline. It can be aimed effectively whereas previous flamethrowers, using a petroleum liquid fuel, had to be fired down the wind and were risky to use.

The "gel gas," which sticks to whatever it strikes, is made by adding a gray powder to ordinary motor gasoline. This thickened oil increases the range of the weapon three-fold. Since the gel is just beginning to burn when it reaches the pillbox, fire instead of just flame is really being thrown at the enemy. The fuel leaves the nozzle of the flamethrower, which weighs no more than a soldier's full pack, as a glowing rod of fire and flows much like water when the hose nozzle is set for a sharp stream.

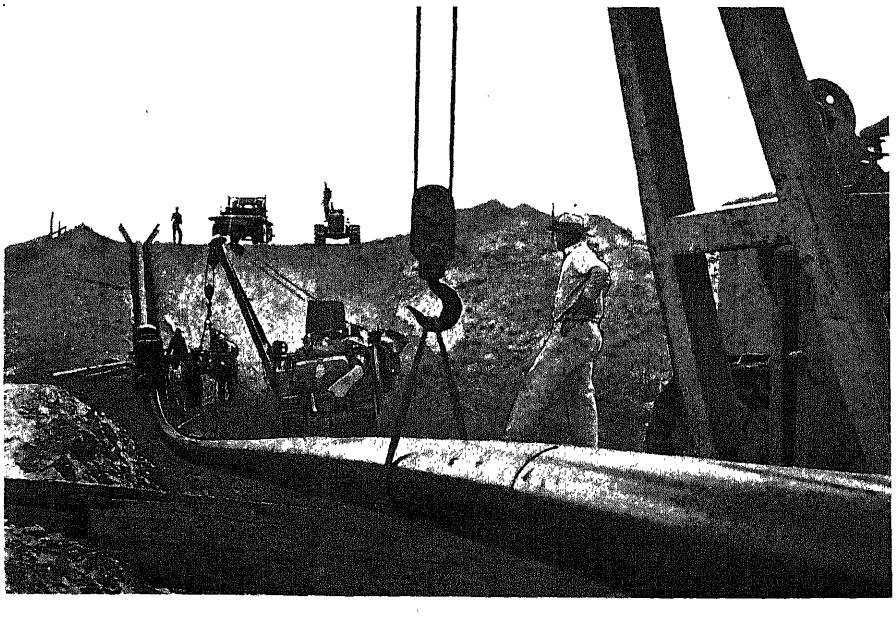
Gel gas is also used in incendiary bombs which can destroy factory buildings and the machines in them. Although the flame temperature of magnesium, used in the bombs which fell upon London early in the war, is higher than that of gasoline, it was found that gasoline has a heat content almost twice that of magnesium and is thus better for starting destructive fires.

The bombs, which look like a piece of hexagonal pipe, can be packed into clusters of as many as 60, the clusters breaking open as they fall. The bomb is equipped with a fuse which begins its deadly work only upon striking the ground. It ignites a three- to five-second powder train which allows enough time for the bomb to come to rest on its side. The powder train explodes a mixture of black powder and magnesium which hurls an ignited cheesecloth sock filled with the gel gas from the tail of the bomb; it strikes with such force that the sock is broken and flaming "goo" spread all around.

The bomb is kept right side up by a cloth tail streamer which flies out when the bomb falls free. This makes it possible to aim with greater accuracy. The streamer also slows the fall so that the bomb does not strike so hard as to keep it from exploding properly.

Smoke so concealing that enough can be quickly generated from two quarts of the liquid mixture to hide the average city block is protecting our men and positions overseas. Generated from a petroleum derivative, the oil fog comes out like steam from a locomotive safety valve and hangs over the area, hiding it completely. The smoke particles are so small that it would take tens of thousands of them, set side by side, to make a row one inch long.

The new smoke-making mixture, which has a petroleum base, is inexpensive to produce, plentiful to supply and entirely harmless to those whom it conceals. Men can breathe it, walk through it with their eyes wide open, and even smoke in it.



TO REFINING PLANT—A 12-inch pipe line is being laid to carry the "rock oil" from field to refining plant. Photographs from the new photographic library of the Standard Oil Co.

OIL SEARCH—Field geologists in their search for petroleum deposits are shown taking measurements in the Big Horns, Wyo.

Although these new petroleum-users were developed solely to help win the war, they find peacetime applications. Some believe that the smoke-generator may help protect crops by keeping orchards and fields from freezing when a cold wave suddenly begins to nip young buds. If you are "roughing it" for several days and run out of fuel for your stove, that postwar steak can still be done to a turn. Just make some "canned heat" similar to the gel gas by adding a little of the special powder to your motor gasoline.

Lower-cost cars for a given performance and increased mileage are expected to result from 100-octane gasoline. As much as 35 to 40 miles to the gallon will be possible—say three or four years after the war—when engines are built to get the most out of the new gas. With a slight modification of the engine head, existing cars could take reasonable advantage of gasoline approaching 100 octane, say petroleum officials.

Owners of new cars after the war may not appreciate improvements which have been made in high quality oils, but those who buy used cars will find that the engine runs more smoothly and lasts longer. Oils which resist oxidation, and are not as likely to cause piston rings to stick or to let varnish deposits form, have been obtained by adding as little as one to 2% of a metallic derivative of phenolic structure.

Lubricants have been developed from petroleum which more effectively keep moisture out of delicate engine parts, thus protecting against deterioration billions of dollars worth of material shipped to all parts of the world. Some types of greases, which look as black and sticky as asphalt, not only prevent rust but tend to displace slight bits of moisture.

About 95% of the toluol, the second "T" in TNT, came during the last war as a coke byproduct. The first tank car of synthetic nitration-grade toluol was made in America just 16 months before the war broke upon us. Today most of the toluol used in our shells, bombs and torpedoes is made synthetically from petroleum. Toluol will probably be greatly used as a solvent for paints and dyes in the plastics industry after the war.

Raincoats which drape nicely about the figure and storm suits which keep out the cold and wet will probably be made after the war of synthetic rubber. Large quantities of synthetic rubber are now being made from butadiene (from petroleum) and styrene (from coal tar) to keep our tanks and jeeps rubber-shod. When peace returns this research may lead to more attractive shower curtains, and washable, long-wearing rubber sheets for baby cribs.

Petroleum Products

The various substances found in petroleum have different boiling points so that the various components may be separated by fractional distillation, or heating. Products from petroleum range from gases, for illumination, heat and synthetic rubber; light oil, which is used for gasoline and kerosene; medium oil, from which metallurgical and Diesel fuels are made; heavy oil, from which come insecticide sprays, paraffin wax and lubricating oils; to residues, which give us wood preservatives, tar for paving streets and airports, coke and emulsifiers.

Newer distillation units pass the petroleum vapors into a "bubble tower," divided into a number of sections. Substances such as heavy oils with higher boiling points condense in the lower sections and flow down through the tower. The hot gases from the furnace bubble through these liquid products, and the gasoline fraction passes out at the top of the column and is condensed separately. Other fractions are withdrawn at different levels. A variety of products may be made by separating and purifying these various fractions.

Catalytic cracking is often used to break down petroleum molecules and rearrange them chemically so as to produce more of certain desirable constituents. "Cat cracker" chemicals come in three sizes: lumps, granules and a powder fine enough to be handled as a fluid.

The "cat crackers" do not turn out 100-octane gasoline as a finished product, but produce the base stock for aviation fuel. When 100-octane gas is taken out, however, less remains for the numerous byproducts made from petroleum.

A number of these "cat crackers" have been built during the war. The production of 100-octane gas is now ten times as great as in 1942.

The octane number of gasoline is measured by the tendency of the fuel not to knock in use. One of the pure hydrocarbon components of petroleum, iso-octane, was discovered earlier to be free of knocks in the highest compression motor it was then possible to build. Another component, normal heptane, was found to knock under almost any circumstances. A fuel-rating scale was thus made with heptane as zero and pure iso-octane representing 100. Gasoline falling between these extremes is rated as if it had a certain percentage of iso-octane, the rest being the knock-creating heptane.

Much of the 100-octane gas today is made by taking iso-octane mixed with tetraethyl lead (which incidentally has an octane number greater than a hundred) and blending it with gas which is rated below 100.

Geologists agree that there are still huge quantities of undiscovered oil beneath our land. We will even end the war with more known oil reserves than before Pearl Harbor because new fields have been found. Engineers have already demonstrated that we can derive synthetic crude oil at reasonable cost from the great reserves of natural gas and the tremendous deposits of oil shale, of tar sands, and of coal and lignite. Oil which can be derived from these sources is believed by many to be enough to supply our needs at the present rate of consumption for more than a thousand years to come.

Science News Letter, July 14, 1945

DENTISTRY

More Than 200,000,000 Teeth Need Pulling

➤ AMERICANS over age three need 238,500,000 teeth pulled and 632,000,000 fillings made in their teeth, the subcommittee on health of the Senate Committee on Education and Labor has been informed.

(turn page)

Do You Know?

In one summer, a single *fireweed* plant will produce 80,000 seeds.

Bodies of some postwar *cars* may be made of plywood.

The *muscle fibers* of man are approximately .001 inch in diameter.

The *cowbird* perches on cattle to feed upon insect parasites.

Leaf-cutter ants cultivate for food a certain fungus on balls of leaf tissue.

Some incubator-hatched *turkeys* never learn to eat without help; force-feeding is sometimes necessary.

The *bat* usually has a single young one at a time, and the mother carries it about on her aerial journeys.

The saw on a *sawfish,* which may be five feet long, is a weapon of defense, as with it dangerous sidewise strokes can be made.

Alcohol, made from molasses, sugarcane and surplus sugar in Brazil, is mixed with gasoline and sold for motor fuel.

There are no *sulfa drugs* or even sulfonamides of any description in nature as far as is known; they are products of synthesis.

Many reports of the amount of *ozone* present in the air are inaccurate, due to the difficulty of knowing that it is ozone being tested, and not some other oxidizing matter.

Fresh-cut *saplings,* stood for about six hours in a tub containing a solution of chromated zinc chloride, zinc chloride, or copper sulfate, rot much more slowly in the ground when used as fence posts.

* * *

WYOMING

A Summer to remember

The 900-acre Paton Ranch will give you trout-fishing in a mountain stream in the foothills of the Big Horn mountains, daily horseback rides along picturesque canyon trails and excellent food—most of which is grown on the ranch.

The region abounds in geological and historical interest—dinosaur bones, marine fossils and implements used by the Indians many years ago.

Write for illustrated, descriptive folder

PATON RANCH, SHELL, WYOMING

These and other estimated figures of the accumulated dental needs of the population were discussed at committee hearings on dental research and dental care bills. Chairman of the sub-committee on health is Sen. Claude Pepper of Florida.

Dental neglect among children aged six to 18 is such that, according to the estimates, only about 5,650,000 of the annual crop of 22,500,000 decayed teeth are filled.

The population over age three also has an accumulated need for 39,500,000 crowns and bridges, 20,000,000 partial dentures (false teeth), 20,000,000 dental disease treatments and 125,000,000 prophylactic treatments.

Since 1940, one-third of the civilian dentists have gone into the armed services, the committee was further informed. Indicating the variation in availability of dental care, California in 1940 had one dentist for every 1,279 people while South Carolina had one dentist for every 5,263 people.

Science News Letter, July 14, 1945

AERONAUTICS

Planes To Be Tripled

➤ AIR-MINDED America will have ample aircraft in the near future for passenger travel, air express and mail. Nearly three times as many planes, with nearly six times the seating capacity, will be available for commercial uses as there were before the war when 409 new planes, now on order or on option, are ready for use. All 19 American airlines are increasing their facilities.

These 19 airlines of the United States expect to have 975 planes in their postwar fleets, it is revealed by the Air Transport Association of America. The planes will seat 36,180 passengers. They will provide greater speed, comfort and service than air passengers have ever experienced before. The additional planes will be new, not converted surplus military transports. It has been found, the association states, that the cost of conversion of military transport planes is greater than the cost of new equipment.

The giant of the new planes under order is a 320,000-pound craft, powered with six 5,000 horsepower engines, seating 204 passengers, and with a cruising speed of 340 miles an hour which will enable it to travel from New York to London in nine hours. A new Mars-type 165,000-pound flying boat, four-engined, carrying 106 passengers, will be able to cruise at over 200 miles an hour with a payload of 28,000 pounds for more than 3,000 miles.

Other new planes will have seating capacities ranging from 128 down to 14 passengers. Some will have cruising speeds up to 325 miles per hour. Several will weigh 100,000 pounds or over.

The new planes for overnight trips will have different combinations of staterooms, berths and reclining chairs. They will have separate rest rooms for men and women. Wherever necessary all planes will have pressurized cabins to maintain low-altitude conditions at "over-the-weather" heights, together with air-conditioning, thermostatic temperature control, and individual ventilation. Windows will be larger and better arranged for observation. Electric stoves and refrigeration will permit the serving of satisfying meals.

Many scientific war developments that gave American war planes advantages over those of the enemies will be incorporated into the new civilian commercial aircraft. Among these are radar and electronic devices which permit landing under practically zero ceiling and visibility, and avoid risk of collision by enabling pilots to see other planes even in the thickest weather.

Among the new instruments is the Sperry "Gyrosyn" compass, which is a gyro synchronized with a magnetic compass, giving much greater accuracy in navigation. Also there is a far-advanced, radio-aided system of airway traffic control, which will be vital when planes are landing and taking off six a minute at the larger airports.

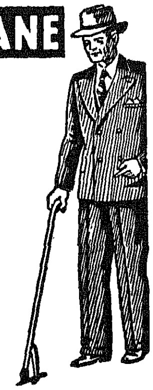
Science News Letter, July 14, 1945

NEW "PICK-UP" CANE

Permits Disabled Persons To Pick Up Small Articles Without Painful Stooping.

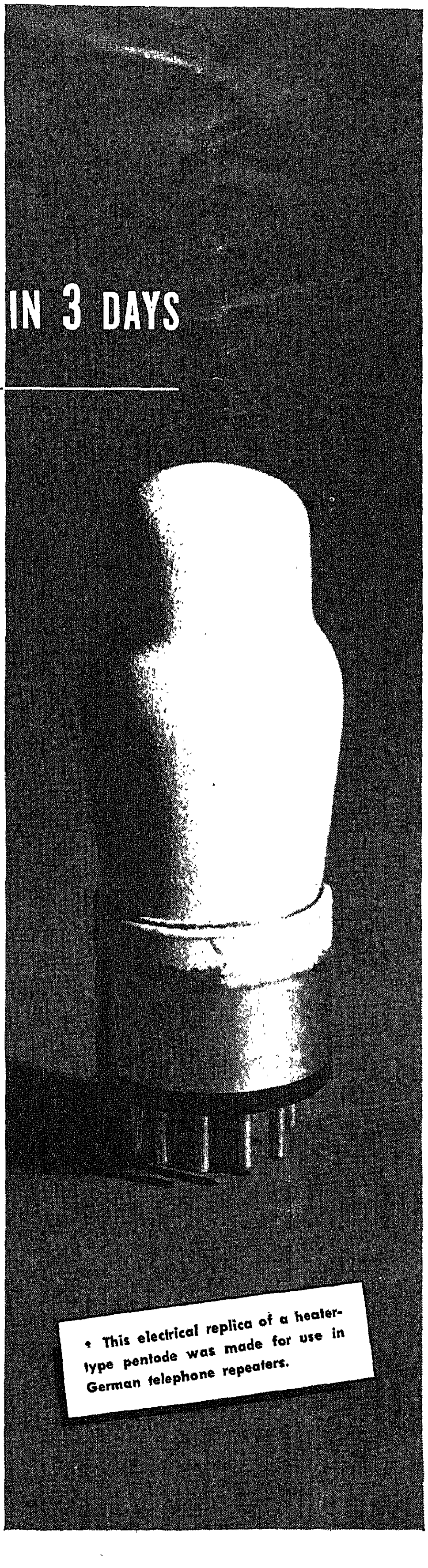
NO OTHER CANE LIKE IT

The Mason "Pick-Up" is a light double purpose cane with concealed patented pick up mechanism that enables the user by simple finger pressure and without any stooping to easily pick up papers, pencils, cards, coins, etc. Proper balance and rubber grip tip insures safer walking. Use a beautifully finished Mason "Pick-Up" Cane yourself or as a perfect gift for a disabled service man or friend. Write today for FREE CIRCULAR and 5 DAYS TRIAL OFFER.



W. H. MASON Box 27, Leesburgh, Ohio

DUPLICATING A GERMAN VACUUM TUBE IN 3 DAYS



• This electrical replica of a heater-type pentode was made for use in German telephone repeaters.

Just behind the battlefront, a telephone system lay dead. The retreating enemy, hoping to return, had not blown it up, but had taken with them its vacuum tubes. To put it back to work, the General ordered 1000 new tubes — spot delivery.

A sample tube was flown back to the United States and brought to Bell Telephone Laboratories. It was of German design, different from any American tube in both dimensions and characteristics. Could it be duplicated soon? The job looked feasible. Within three days, try-out models were on their way to Europe. Three weeks later, Western Electric Company had made and delivered every tube. They were plugged in; vital communications sprang to life.

Vacuum tubes are an old story for Bell Laboratories scientists. Back in 1912 they made the first effective high vacuum tube. Three years later, they demonstrated the practical possibilities of tubes by making the first radio talk across the Atlantic, pointing the way to radio broadcasting. Since then, they have developed and utilized the vacuum tube wherever it promises better telephone communication — there are more than a million in your Bell Telephone System.

Today, Bell Telephone Laboratories is solving many of the toughest tube problems faced by the Armed Forces. When the war is over, it goes back to its regular job—keeping American telephone service the best in the world.

BELL TELEPHONE LABORATORIES

Exploring and inventing, devising and perfecting for our Armed Forces at war, and for continued improvements and economies in telephone service.

MARINE BIOLOGY

DDT Checks Barnacles

➤ THE NEW insecticide, DDT, gives promise of eliminating barnacles from ships' bottoms and other marine structures. Barnacles failed to attach themselves in six months' time to wooden panels coated with a paint developed by Prof. R. E. Dimick, of Oregon State College.

This paint contained DDT, chemically dichlorodiphenyltrichloroethane, and no other known toxic substance. Control boards treated with the ordinary antifouling paints were heavily covered with barnacles and other salt-water fouling animals after three months' submersion in marine waters.

The anti-barnacle paint was one of a large group tested at the Yaquina Bay Fisheries Laboratory operated by the Oregon Agricultural Experiment Station. Since DDT is insoluble in water, the expectations are that its antifouling properties may greatly exceed the initial test period of six months. Studies are being continued to determine the efficiency of DDT as antifouling agent for marine animal forms other than barnacles, as a control for wood-boring marine mollusks and crustaceans, and to ascertain if the insecticide exhibits differences in antifouling properties for the various species of barnacles.

Since barnacles now have to be scraped periodically from ship hulls and marine growths foul ships and reduce speed materially, the successful and practical development of the DDT antifouling paint would undoubtedly save millions of dollars annually.

Science News Letter, July 14, 1945

CHEMISTRY

Lignin Now Found Useful With Fertilizers

➤ LIGNIN, a by-product of pulp and paper mills that has long been regarded as "the largest waste in industry", is now found useful with fertilizers to add humus and organic matter to depleted soils, Robert S. Aries, research associate at Yale University, has revealed.

This new use of lignin, he says, is an "extremely important discovery, because of the tonnage involved." Lignin is an organic substance which, with cellulose, forms the chief part of woody tissue.

In addition to 2,000,000 tons of lignin now discharged annually by mills into streams and rivers, he asserted, sawmills and other woodworking plants throughout the country "can readily make available another 10,000,000 tons of wood waste which can readily be incorporated into fertilizers."

"As a result of present day experiments," he continued, "lignin may assume an important part in this nation's soil building and conservation program. It will be a 'wealth from waste' movement, since lignin at present pollutes the nation's rivers; as fertilizer, it will definitely aid in providing higher land values and richer soils."

The part played in soil improvement by using lignin with fertilizers is largely to supply organic matter.

"If lignin is used on presently fertiized soils which need humus and organic matter, it is estimated that the efficiency of these soils would be raised about 20%," he said.

Science News Letter, July 14, 1945

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BOTANY

NATURE RAMBLINGS

by Frank Thone

Growths of Evil

➤ RAGWEEDS are getting fairly into bloom about now, over the northern part of their range. In a few weeks their waves of windborne pollen will sweep southward to the Gulf, and the sorrowful season of sneezes and bleary eyes will be on for thousands of hayfever sufferers. There will be no real letup until frost, for even though many municipalities now conduct summer weed-mowing campaigns, ragweed pollen grains are so light that they float for miles on the wind, and there are plenty of sources out in the country to keep the air of even the largest cities most dolefully contaminated.

Why ragweeds should bear the responsibility for nine-tenths of summer hayfever cases is still more or less of a mystery. To be sure, there are enormous quantities of both tall and low ragweed, and both species are prolific producers of pollen. However, other windborne pollens, such as pine and spruce, are often much more abundant than ragweed pollen, at least in certain regions, yet these tree species seem to cause few if any cases of hayfever. There simply seems to be some specific malignancy in the ragwood

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pollen itself—some quality in its protein that makes it easier for human mucous membranes to react to it in that still-mysterious chemical behavior known learnedly, but not at all understandingly, as sensitization.

This touchiness of many persons' respiratory tracts to ragweed pollen has made ragweeds a profitable crop for at least a few hardy-nosed individuals. They hand-harvest quantities of it for a few pharmaceutical manufacturing concerns that use the pollen in immunizing preparations—more or less on the hair-of-the-dog-that-bit-you principle. A number of other hayfever-causing pollens are similarly harvested, but the most important by far are the ragweed pollens.

Hayfever is very definitely a disease of civilized communities. So long as our country was in the pioneer stage of development there was far less hayfever than there is now. Ragweeds do not thrive at all in the forest, and did but ill on the unbroken sod of the virgin prairie. They are primarily weeds of disturbed soil, growing most lustily on neglected road-edges and in ill-cultivated field-corners. The low ragweed also springs up in cut-over or burned-over forest areas, and in over-loaded pastures where the sod has been gnawed and trodden thin. So if we complain of these bad neighbors, the ragweeds might readily answer, "Well, it's your party—you invited us!"

Science News Letter, July 14, 1945

• Books of the Week •

➤ THE UNITED STATES QUARTERLY BOOK LIST, Vol. 1, No. 1, March 1945 Library of Congress (*Government Printing Office*), 64 p., 35 cents. To carry to the other American republics information about selected U.S.A.-published books, this serial has been established officially with an advisory committee representative of scholarly scientific and library agencies. Of a high order of editorial execution, the notices are informative and usefully critical. One has to search for classifications that might interest a SNL reader, for archaeology is under fine arts, psychology is under social sciences, while medicine, along with hygiene and public health, are tucked away in biological sciences, and engineering is labeled technology. Many books that will be of immense value to our good neighbors are unlisted as presumably must be the case in a selected listing. But a relatively complete listing in 6 point type might be justified.

Science News Letter, July 14, 1945

• Just Off the Press •

CALCIUM METALLURGY AND TECHNOLOGY—C. L. Mantell and Charles Hardy—*Reinhold*, 148 p., illus., $3.50. Amer. Chem. Soc. monograph series.

CANCER OF THE COLON AND RECTUM, Its Diagnosis and Treatment—Fred W. Rankin and A. Stephens Graham—*Thomas*, 358 p., illus., $5.50. 2nd printing.

DENTAL CHRONOLOGY: A Record of the More Important Historic Events in the Evolution of Dentistry—Hermann Prinz—*Lea*, 189 p., illus., $3.

GUIDE TO UNITED NATIONS and Allied Agencies—*United Nations Information Office*, paper, 50 cents. Limited to agencies set up as an outcome of the German attack on Poland, September 1, 1939.

HISTORY IN THE WRITING—Gordon Carroll, ed.—*Duell*, 401 p., $3. Dispatches by the foreign correspondents of Time, Life and Fortune.

PISTOL AND REVOLVER SHOOTING—Walter F. Roper—*Macmillan*, 256 p., illus., $2.49.

PRINCIPLES OF MODERN BIOLOGY—Douglas Marsland—*Holt*, 774 p., illus., $3.75. A complete reconstruction and modernization of Charles E. Plunkett's ELEMENTS OF MODERN BIOLOGY.

TELEVISION PROGRAMMING AND PRODUCTION—Richard Hubbell—*Murray Hill*, 207 p., illus., $3.

TOWARDS FREEDOM IN THE AIR—*United Nations Information Office*, 31 p., paper, 10 cents. The story of the international civil aviation conference.

WHAT IS LIFE? The Physical Aspect of the Living Cell—Erwin Schrodinger—*Macmillan*, 91 p., illus., $1.75. Based on lectures delivered under the auspices of the Institute at Trinity College, Dublin, in February 1943.

Science News Letter, July 14, 1945

PSYCHIATRY

NP Dischargees Think Service Affected Health

➤ MEN discharged from the Army because of psychoneurosis in general think their health was impaired by their Army service. They think of their health impairment chiefly in terms of physical disease and in general do not recognize the psychologic aspects.

These are among findings reported by Lt. Col. Norman Q. Brill and Col. William C. Menninger, Army Medical Corps, and Miss Mildred C. Tate, American Red Cross psychiatric social worker, in the *Journal of the American Medical Association*, (June 30).

The findings result from questionnaires answered by 4,178 men of some 5,000 questioned.

The "vast majority" of the men, 85.9%, are working. More are unemployed now, however, than were unemployed at the time of induction. Before induction 93.7% were employed. Those who are not working blame this on their poor health.

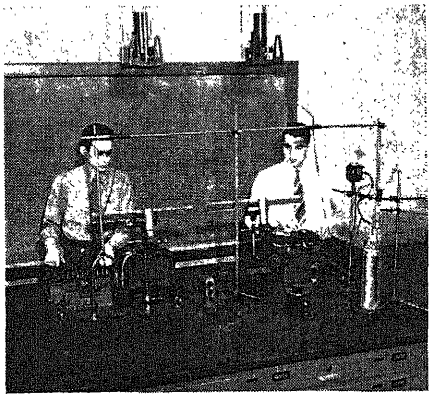
The findings, it is pointed out, reflect only what the men report about their health and may not reflect its true state. Exaggerations may have been made consciously or unconsciously.

The longer the men served in the Army, the more likely they are to think their health was affected. Those who saw overseas service think they are sicker than those who did not. There is a "distinct suggestion" that the men think their ill health is permanent.

"Active measures will have to be taken if this attitude or state of affairs is to be influenced," the report states.

What the future holds cannot be predicted, it is stated. Various conditions may work in opposite directions. Time may bring some improvement in health. The end of the war may cause a change in "intrapsychic tension and need for illness." Employment is easy to secure now. If there is increased competition for fewer jobs after the war, that will influence the adjustment of these men, as will the socioeconomic condition of the postwar world.

Science News Letter, July 14, 1945



CALIBRATING THERMOCOUPLES WITH MUELLER BRIDGE

A mid-western educational institution's Chemistry Dept. contains the above laboratory for calibrating thermocouples.

The couple's thermal electromotive force is accurately measured with the Type K-2 Potentiometer at right, and the equivalent temperature is established by a certified resistance thermometer and the Mueller Bridge at the left.

These two instruments are a particularly quick, dependable and economical team. For details, write us or see Catalogs E-33A(1) and E-50B(3), sent on request.

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• New Machines and Gadgets •

⚙ *COMBINATION stool and kit bag has an ordinary pivoted frame and canvas seat, but suspended under the seat is a commodious bag opening on the ends, suitable for carrying lunches or small working implements. Flat leather or fabric handles on the sides are used for carrying.*

Science News Letter, July 14, 1945

⚙ *PHOTOELECTRIC crack detector, to inspect glass jars and bottles to be used as food containers, automatically singles out and rejects those that have minute cracks or surface irregularities as they pass by on a rotary turntable. Only those safe for airtight sealing are accepted.*

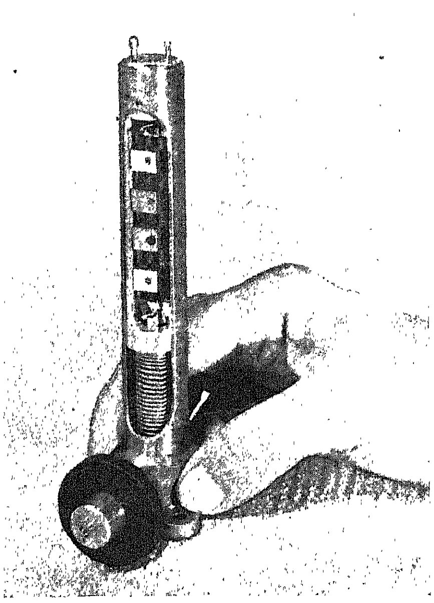
Science News Letter, July 14, 1945

⚙ *HEARING losses can now be tested by enclosing each ear in a soundproofed box containing a small loudspeaker. The box cuts out random noises, and the sound from the loudspeaker can be regulated. It is particularly effective in discovering a marked loss of hearing in one ear only.*

Science News Letter, July 14, 1945

⚙ *FACTORY TRUCK, with an elevator arrangement on the forward end from which two heavy horizontal prongs project, carries coils of wire around a shop where much wire is used. The prongs stick through the coils. Boxes are carried resting upon the prongs or suspended by tongs under them.*

Science News Letter, July 14, 1945



⚙ *VIBRATRON, shown in the picture, is a new precision instrument versatile enough to help in many industrial problems, including measuring a wide range of physical qualities such as temperature and pressure, and in the audio-frequency field. A stretched wire in an electro-magnetic field is the actuating element.*

Science News Letter, July 14, 1945

⚙ *BOOK COVER, and support to hold a book in an inclined position when resting on a table, is stamped from one piece of material, then folded in the same manner as the ordinary cover. This new cover, however, has triangular pieces on the two faces that may be folded downward to form supports.*

Science News Letter, July 14, 1945

⚙ *GERMICIDAL SOAP, effective, non-toxic and non-irritant, is possible with a germicide that retains its full bacteria-killing properties in almost any soap. The soap should contain a fairly large amount of coconut oil fatty acids to be effective against typhoid and other intestinal tract germs.*

Science News Letter, July 14, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 267.*

BOOKS

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Question Box

AERONAUTICS

How many planes will there be for passenger travel in the postwar period? p. 28.

What plane is capable of five miles a minute? p. 23.

AGRICULTURE

In what states will Turkish tobacco be grown this summer? p. 25.

ASTRONOMY

How are "hidden" stars now studied? p. 22.

DENTISTRY

How many teeth in this country need pulling? p. 27.

ENGINEERING

How is it possible to have tires that are good for 100,000 miles? p. 21.

GENERAL SCIENCE

What type of laboratories will be listed by the National Research Council in the future? p. 25.

MEDICINE

How successful ha [illegible] in the treatment of infantu [illegible] 20.

What treatment completely banished the pain and other symptoms of trench mouth? p. 21.

ORNITHOLOGY

How many wing strokes does a ruby-throated hummingbird make each second? p. 24.

PHYSICS

Why is the Nazi story of a stratosphere platform so fantastic? p. 22.

PHYSIOLOGY

What seems to be the answer to the question of how living muscles contract and relax? p. 19.

PUBLIC HEALTH

How will civilians be able to get blood plasma in the future? p. 23.

VOLCANOLOGY-AERONAUTICS

How will Paricutin be investigated? p. 19.

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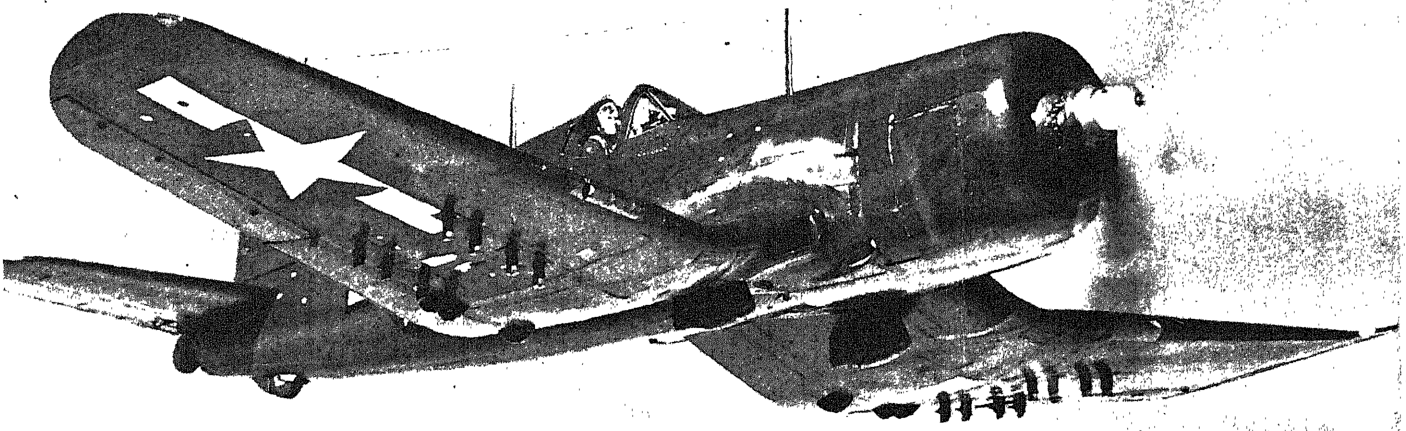
THE WEEKLY SUMMARY OF CURRENT SCIENCE • JULY 21, 1945



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Imperial Agricultural Research Institute,
New Delhi.

Fastest Fighter

See Page 38

A SCIENCE SERVICE PUBLICATION

These scientists are working for you

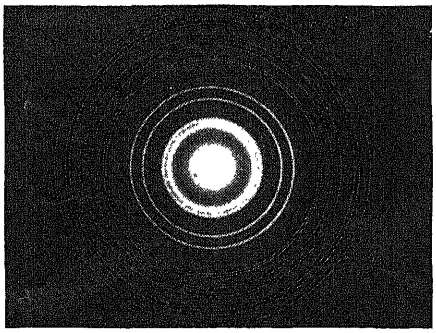
A G-E SCIENTIST, winner of the Nobel prize, studies oil films in a pan of water. And out of this research comes a clue to make glass invisible, to make metals stronger, to create a fog by machine.

Engineers working with certain kinds of radio waves run a temperature. A G-E fever machine utilizes this principle, so doctors can treat patients with artificially created fevers.

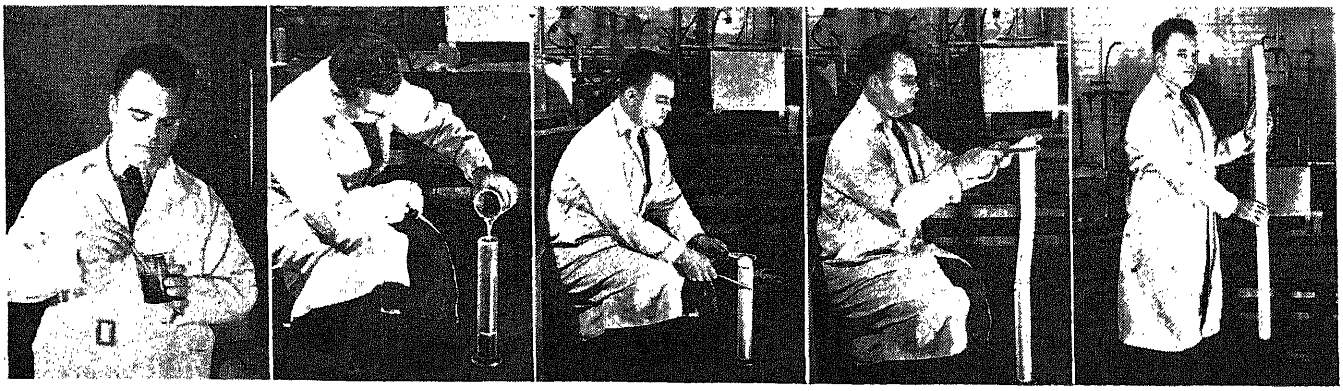
This page of pictures isn't one-hundredth part of what is going on at General Electric. But you will see a few ways in which life can be made easier, healthier, and happier. And that's what we are trying to do. *General Electric Company, Schenectady, New York.*

Worst weather in the world is found atop Mt. Washington, N.H., where ice feathers like these sometimes grow three feet in a single night, and where G-E scientists are conducting cold weather research for the Air Forces. General Electric devices are helping the Signal Corps, the Weather Bureau, and the Air Forces predict the weather all over the world. Accurate weather prediction aids troop movements, saves crops, protects you.

Ever see pure vitamins? These three pinches of vitamin crystals in the hand of a G-E scientist are enough carotene, vitamin C, and thiamin to supply the average man for one day. Research at G-E Consumers Institute helps improve diet, make food taste better.



Electrons took this photo. This picture of gold, made by shooting electrons through a gold sheet less than *one-millionth* of an inch thick, was made in the G-E Research Laboratory, where scientists are studying metals to make new stronger combinations.



You can actually see it grow. New G-E foam plastic grows like magic at the rate of an inch a second from a liquid resembling molasses. | When it stops growing, it's ready for use. Lighter for its size than a loaf of bread, it promises to have many uses after the war.

★

Hear the G-E radio programs: *The G-E All-girl Orchestra*, Sunday 10 p. m. EWT, NBC—*The World Today* news, Monday through Friday 6:45 p.m. EWT, CBS—*The G-E House Party*, Monday through Friday 4:00 p. m. EWT, CBS.

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GENERAL ELECTRIC

ASTRONOMY

Eclipse Report

Weather favored all except the most elaborate expedition in Canada where totally eclipsed sun was hidden behind cloud banks.

By CHARLES A. FEDERER, Jr.

Harvard College Observatory

Wiring from Bredenbury, Saskatchewan

➤ PERFECT weather conditions favored practically all places along the path of the moon's shadow from Butte, Montana, to Pine River, Manitoba, except at Bredenbury, Saskatchewan, where was located probably the most elaborate eclipse expedition ever assembled. It was in this region that most amateur and professional astronomers were gathered to observe the total eclipse on Monday, July 9.

Three miles southeast of Butte the group from the New York Amateur Astronomers Association saw the sun totally eclipsed only 14 minutes after sunrise and carried out a perfect set of observations with motion picture and still cameras. A diamond ring was observed at second contact, the beginning of totality, which was not reported by other observers along the path. At Wolseley, however, Dr. Roy K. Marshall, leader of an expedition from Philadelphia, saw the diamond ring at the end of totality.

The Philadelphia expedition, which included Dr. Orren Mohler of the McMath-Hulbert Observatory and Dr. Richard Sutton of Haverford College, took satisfactory photographs with a 40-foot camera, an 18-foot camera and two cameras of 28 inches focal length. Dr. Marshall described the corona as of typical minimum type, with short polar plumes and longer equatorial streamers, looking like the flame of a kerosene lamp extending from each side of the sun.

At Francis, somewhat south and west of Wolseley, observers from Regina had favorable skies. They saw several groups of spots on the sun before eclipse and "Baily's beads" at both contacts. At Pine River, Yerkes Observatory astronomers W. A. Hiltner and S. Chandrasekhar were fortunate to have a cloudy sunrise turn into a clearly seen eclipse. Dr. Hiltner also described the corona as of the minimum type.

"Baily's beads" were seen at second contact by C. M. Prinslow, of the Milwaukee amateur group, who timed the total eclipse as lasting 37.2 seconds, just about as long as predicted for that station. With a low-power eyepiece, Dr. Hiltner observed many small prominences and some large ones.

The Milwaukee amateurs accomplished their purpose of taking an accurately-timed photograph of the solar spectrum changing into the flash spectrum, this being expected to be of value in timing the moon's motion, especially if similar successful results are obtained by eclipse observers in Sweden and Russia.

Most observers noticed Venus so bright it was seen after totality had ended, while Aldebaran, a first magnitude star near by, was also seen by many. Saturn, close to the sun, was a most noticeable object.

By DR. JOHN Q. STEWART

Princeton University Observatory

and JAMES STOKLEY

General Electric Research Laboratory

Wiring from Butte, Montana

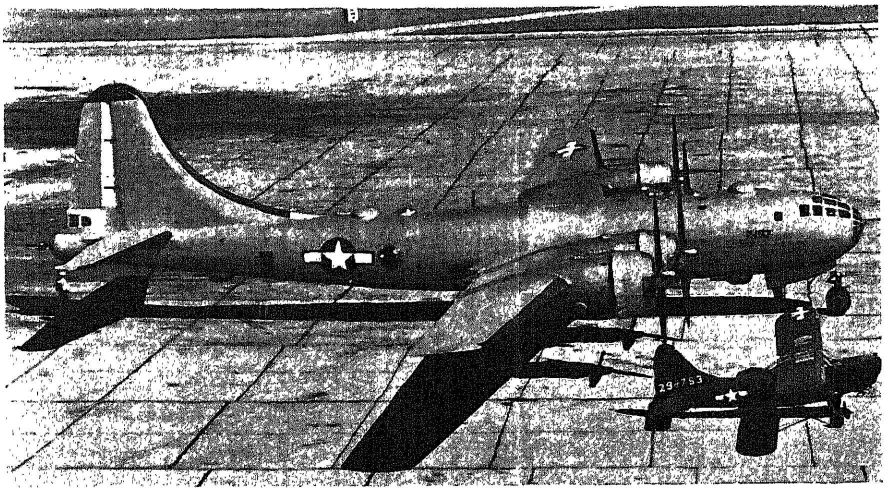
➤ THE TOTAL solar eclipse seen Monday morning, July 9, took place during 11 minutes of clear sky, which enabled us to make our observations while the sun was passing from behind one cloud bank to another.

About 125 people from Malta motored with us before sunrise to a knoll in the prairie 15 miles to the south. Half of this number actively aided visual observations by Dr. John Q. Stewart, and 15 other persons tended to confirm the existence of the globular corona first described in the 1937 eclipse.

The streamers of the sun's corona which flashed out brilliantly and sharply during the 30 seconds of totality seemed to be imbedded in a general hazy luminosity surrounding the sun. The phenomenon of the "falling shadow," characteristic of a sunrise eclipse and not previously described, was satisfactorily observed, although the general overcast of altocumulus clouds made the passage of the moon's shadow in the atmosphere less spectacular than it would have been with clear skies.

It was a dark eclipse and markings on a camera dial could not be read during totality. On account of the clouds, stars could not be seen. The color effects were most impressive and of a kind never duplicated at ordinary sunrises or sunsets. During the eclipse the sun was only seven degrees above the northeastern horizon, and underneath it, there could be seen a saffron glow from sunlit air beyond the boundary of the moon's shadow.

Approximately 36 photographs of the corona and the moon's shadow on the clouds, many of them in color, were taken. Some were by Dr. Ira M. Freeman, astrophysicist, working on wartime research at Princeton University, and Mrs. Freeman. This number includes photographs taken by James Stokley with a special camera designed by Frank Benford of the General Electric Research Laboratory which records the entire sky,



COMPARISON—A huge B-29 Superfortress and a tiny L-5 Liaison type airplane are parked beside each other on the flight apron at Harvard Field, Nebraska. Overall length of the Superfortress is 99 feet against the L-5's 24 feet, 1 inch. U. S. Army Air Forces photograph.

and exposures made from an airplane by James L. Artig, Jr., astronomy student at University of Minnesota. Mr. Artig, who was piloted by Harold Ebaughnat to an altitude of 9,000 feet, reported that a band of condensed water vapor perhaps 15 miles wide formed during totality along the central part of the shadow track. This did not disappear through evaporation until several minutes after the sun reappeared. The plane flew about 2,000 feet under the clouds, but was maneuvered to a clear space where an excellent view of the corona was obtained.

Science News Letter, July 21, 1945

MEDICINE

Record-Breaking Recovery

A Marine who had 83% of his body surface burned went back to duty within three months. Up to the present war, similar burns have usually been fatal.

➤ BREAKING most if not all records for recovery from extensive burns is a case reported by Lt. Comdr. John R. Johnson, of the Navy's Medical Corps, in the *Naval Medical Bulletin* (July).

The 19-year-old marine had 83% of his body burned in a gasoline explosion. Up to the present war, first degree burns involving two-thirds of the body surface and second degree burns in adults involving one-third of the body surface were generally fatal. Within three months after the injury, Lt. Comdr. Johnson's patient had not only recovered but returned to duty.

When this young man was brought to the hospital four hours after the explosion, he had second and third degree burns over all of his body except the part of his head covered by thick hair, the short edges of which had been burned; his feet and ankles which were covered by field shoes; and the part of his body which was "clothed in abbreviated shorts." He also suffered inhalation burns of his lungs.

The patient was excited and in shock. His recovery was complicated by dropsy, hemoconcentration (thickening of the blood), merging into a stage of infection, progressive anemia, thrombophlebitis of both legs, and a clot in a lung artery with death of part of the lung tissues.

Treatment included blood plasma and albumin, sufa drugs, penicillin, nasal tube feeding blood transfusion, oxygen during the lung involvement, vaseline-paraffin impregnated gauze dressings on the extremities, vaseline-paraffin spray over the trunk, sufathiazole ointment on the face and skin grafts.

The skin grafting had to be delayed a week or two beyond the best time for this procedure until enough burned areas had healed to make skin available for grafting onto other areas.

The patient was allowed out of bed the 46th day after injury and evacuated to the rear as a walking patient with his burns completely healed on the 62nd day. He returned to duty one month later.

Science News Letter, July 21, 1945

PHYSICS

Thoriated-Tungsten Wire Tested by Simple Device

➤ A NEW technique developed by scientists of the Radio Corporation of America, has reduced by more than 87% the time required for checking thoriated-tungsten wire to insure its efficiency when used for filaments in radio transmitting tubes.

Taking advantage of the radioactive properties of thorium, the new method employs a Geiger counter to indicate by audible signals the presence and adequacy of the thorium content of the wire. This procedure represents a decided simplification of the former method, which was dependent on spectographic analysis. The latter method required a skilled operator; the new technique can be applied by an average factory worker.

The Geiger counter, generally regarded as a laboratory instrument heretofore, was successfully enlisted in war production at RCA's electron tube manufacturing plant at Lancaster, Pa., following a series of experiments conducted by G. R. Feaster, RCA physicist. Through the cooperation of Dr. J. R. Dunning, of Columbia University, Mr. Feaster was enabled to use Columbia's equipment for the early experiments.

A qualitative check of all thoriated-tungsten wire is necessary to eliminate costly errors which would result if unthoriated wire should be mistakenly substituted for the thoriated wire, but the spectrographic analyses formerly used were time-consuming, even on a production basis, and required the services of a skilled operator.

Factory experience with the new technique, using equipment manufactured under the direction of H. A. Glassford, of Columbia University, shows that eight days of testing by the former method may now be run in a single day. The use of a pre-scaling loudspeaker monitor permits the average factory worker to detect the radioactivity of a spool of thoriated wire in a few seconds. By means of a scale-of-sixteen counting circuit and counter, semi-quantitative determinations can be made when desired.

Science News Letter, July 21, 1945

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MEDICINE

Amputations Avoided

Penicillin injections into artery are advised for severe infections of arms and legs. Success with this method in 24 cases is reported.

➤ AMPUTATIONS may be avoided and severe infections of hands, feet, arms or legs cleared up when penicillin is given by injection into an artery instead of by other methods.

Success with this method in 24 cases, believed the first treated in this way, is reported by Dr. S. Thomas Glasser, Dr. John Herrlin, Jr., and Dr. Boris Pollock, of New York Medical College and the Flower-Fifth Avenue and Metropolitan Hospitals, in the *Journal of the American Medical Association* (July 14).

One injection may cure cases of infection and inflammation without pus formation and discharge and without death of tissues, the doctors report.

Pain is often greatly relieved following the first injection. When amputation is necessary, it may be frequently possible to save more of the leg or arm, hand or foot than would otherwise be saved.

Infection complicating diabetes and arteriosclerosis, which often results in gangrene requiring extensive amputation, is a condition for which the artery injections of penicillin are particularly recommended. The doctors believe it would also be particularly helpful in war wounds of the extremities.

Less penicillin is needed when given by injection directly into an artery than when given by injection into a vein or muscle or by mouth or local application. Instead of giving injections every three hours round the clock, as is often necessary, only one injection was given on any day in the 24 cases reported.

Injecting the drug into the artery is believed a most efficient way of concentrating it in the part of the body where the infection is located.

Very impressive to the doctors was the case of a 70-year-old man who had necrotic ulcers of his right foot, hardening of the arteries, diabetes and infection. Such a condition "is always regarded with alarm," they point out. This man was given two artery injections, four days apart, of 50,000 units of penicillin each.

"Improvement was prompt and granulations (formation of new flesh) appeared at the ulcer sites within one week," the doctors report. Commenting further on this case, they state:

"Penicillin prevented extension of infection and we are impressed by the rate of healing which, although delayed by arteriosclerosis, is nevertheless far more rapid than we have ever observed under any other method of treatment."

Science News Letter, July 21, 1945

PLANT PATHOLOGY

Wilt-Resistant Tomatoes Produce Disease Weapon

➤ TOMATO plants resistant to the destructive fungus disease known as wilt have been shown to produce a penicillin-like substance that stops the growth of the deadly fungus under closely controlled laboratory conditions, by the experiments of a three-man research team at the great Beltsville experiment station of the U. S. Department of Agriculture. First report of these experiments is given in *Science* (July 6) by Dr. George W. Irving, Jr., Dr. Thomas D. Fontaine and Dr. S. P. Doolittle.

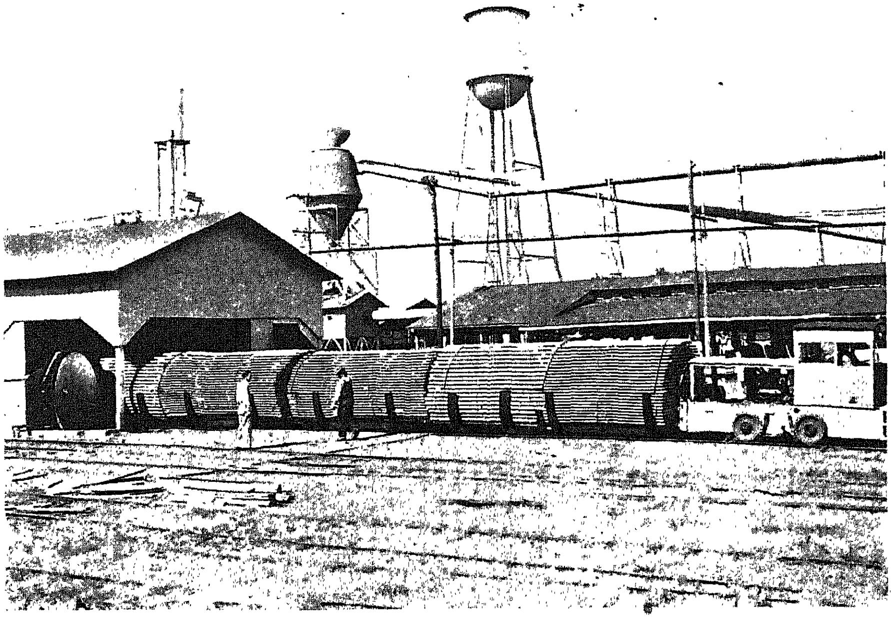
Since some strains of tomatoes are highly resistant to wilt and others are not, it seemed reasonable to conjecture that the resistant kinds contained something hostile to the growth of the fungus. The three men squeezed the juice out of many tomato plants, put it through necessary filtering and purification processes, and then exposed growing masses of the wilt fungus to its action in carefully measured quantities. In all cases, the degree to which the fungus growth was checked corresponded rather closely to the known wilt-resistant qualities of the plant from which the juice was taken.

The new-found fungus-stopping substance has not been isolated in pure form, so that its exact chemical nature is still unknown. Some facts about its chemical and physical properties, however, have already been uncovered.

It is present in all parts of growing resistant plants. It has not been found in tomato seeds, but appears in the seedlings very soon after they sprout. Concentration varies somewhat according to age of the plant, also from part to part.

Because the generic name of the tomato is *Lycopersicum,* the fungus-stopping substance has been given the name lycopersicin.

Science News Letter, July 21, 1945



TERMITE PROOF—At this wood-preserving plant for the Navy's advance bases, these tent poles are ready for pressure treatment with Wolman salt solution which will ward off attack by termites and fungi. Wooden poles, canvas and even tent poles are given chemical treatment for protection against fungi, mold and termites.

AERONAUTICS

Three New Fighter Planes

They are for use in the war against Japan, and include the jet-propelled plane with speed of 500 miles an hour and fastest propeller-driven plane.

➤ THREE NEW fighting planes for war on Japan have been revealed by the Society of British Aircraft Constructors, Ltd. They are the jet-propelled de Havilland Vampire, the twin-engined de Havilland Hornet, and the single-engined Vickers-Armstrong Spiteful. Two other new planes have also been announced, a four-engined Avro Lincoln bomber and a twin-engined Miles Aerovan freight carrier.

The jet-propelled Vampire was the first aircraft in the world to fly at more than 500 miles an hour, the Society states. It is today the fastest plane in service in the world. It is a single-seater, powered by a single gas turbine engine. As it is to be used against Japan, further details remain secret.

The new Hornet, although twin-engined, can be maneuvered with the ease of a single-engined plane. It is claimed to be the fastest propeller-driven aircraft in the world, having a top speed of 470 miles an hour. It is somewhat smaller, as well as faster, than the famous Mosquito made by the same company.

The Spiteful is a version of the well-known Spitfire, or its Navy cousin, the Seafire. It is a faster plane, however, and has a top speed of more than 460 miles an hour.

The new Lincoln is a big brother of the Lancaster which carries the biggest bomb-load of any aircraft in the world, according to the Society. It has a considerably increased range over the Lancaster, and has higher speed.

The cargo-carrying Aerovan, not designed as a warplane, has a freight-car-shaped body with deep straight sides, and a rounded nose and a sharply tapered rear section. It loads and unloads at the rear. It carries a ton of freight at a speed of somewhat over 100 miles an hour. It can take off or land with a run of from 300 to 800 feet, depending upon load, and it can be used where prepared aerodromes do not exist.

Science News Letter, July 21, 1945

ORDNANCE

Flame Jets Pierce Armor

➤ THE TERRIFIC tank-killing power of the bazooka's small rocket missile is not due to its being packed to the limit with a super-high explosive, nor yet to the projectile's ability to plunge through a steel wall. Its velocity is actually very low—you can actually see it as it sails through the air—and more than half the head is simply empty space.

But that empty space is so cunningly disposed that the effect of the few-ounce charge of high explosive is literally that of a fiery sword. What actually goes through the steel is a thin tongue of hard, naked flame, it is explained in *Army Ordnance* (July-Aug).

Outside of professional circles, the thing that gives the bazooka projectile its real power is still very little understood or appreciated, the editor comments. If a solid mass of explosive is detonated outside a steel or concrete wall, it spends itself in a flat blast. But if there is a conical hollow in the charge, with its open end facing the wall, a terrific piercing effect will be generated by the converging detonation waves coming from the sides of the conical hollow, and will drive a jet of flame right through the armor.

Possibilities of what have come to be known as "shaped charges" were first discovered by an eminent Washington scientist, the late Dr. Charles E. Munroe, who spent many years in research on explosives for various government agencies. Some civilian uses were made of his discovery, now called the Munroe effect, in special-type blasting operations. Dr. Munroe died before the outbreak of the present war.

First suggestion of a military application of the Munroe effect was made by a young Swiss engineer, Henry H. Mohaupt, who came to this country with the germ of the idea in 1940. During 1941 he worked with the Ordnance Department of the U. S. Army, evolving what eventually became the bazooka projectile. Mr. Mohaupt later enlisted in the Army and served in the ranks of the Ordnance forces. He ran into the normal amount of skepticism, but had the backing of two able officers, Brig. Gen. R. H. Somers and Col. K. F. Adamson. When his hollow-head charges were tried against armor the results were sensational.

Projectiles embodying the Munroe effect are now used by all armies, enemy as well as Allied, and in all kinds of weapons—rockets, artillery shells, rifle grenades, as well as mines and hand-placed demolition charges.

Science News Letter, July 21, 1945

AERONAUTICS

The New Corsair Is Speediest Plane in Navy

See Front Cover

➤ THE NEW Navy Corsair, fighter and bomber, shown on the cover of this SCIENCE NEWS LETTER, already in use in the demolition of Japan, is the speediest plane in the Navy with a speed of 425 miles an hour, and it can be used from airfields or from carriers. Rapid climbing ability is one of its special qualities as well as speed. Although hundreds have left the assembly line, it has been a closely guarded secret until now.

The new plane is a composite improved model of all the earlier Corsairs. Its four-bladed propeller, over 13 feet from tip to tip, driven by a single 2,100 horsepower Pratt-Whitney engine, gives it the tremendous speed, and an increased ability to climb almost 1,000 feet a minute over its predecessors. It has maneuverability, and is easy to land.

Six 50-caliber machine guns are carried in the wings of the new Corsair, and it can carry a load of 2,000 pounds of bombs or rockets. It has the most modern radio equipment in use with which the pilot can change radio frequencies by pushing a button instead of twisting a knob.

The major change in the new Corsair which was designed by Chance Vought Aircraft and in addition to being built by that company is to be constructed by Goodyear Aircraft, is the incorporation of the Pratt-Whitney Double Wasp 2800-C engine. Very little weight has been added, so nearly all the added horsepower has been transformed into increased speed, climb and ceiling, three of the four basic criteria of air combat. The fourth is maneuverability, with which the new plane is well supplied.

The new Corsair in the Navy is th Chance Vought F4U-4.

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PHYSIOLOGY

POWs Recover Quickly

Liberated American prisoners of war are recovering quickly and fully from starvation. No permanent ill effects in uncomplicated cases, Army reports.

➤ LIBERATED American prisoners of war are recovering quickly and fully from the malnutrition caused by starvation in Nazi prison camps. They will not suffer permanent ill-effects if the starvation was not complicated by other conditions.

This reassuring news is based on a special study of 275 severe cases of malnutrition of liberated American prisoners of war hospitalized during the month of April at the 217th General Hospital in Paris. Results of the study were announced through the Office of the Surgeon General, U. S. Army.

The patients were received at the hospital three to seven days after their liberation and treatment was immediately started.

"A survey was made to determine the average daily gain of weight in uncomplicated malnutrition cases and those who had lost more than 25 pounds gained an average of 1.2 pounds per day during an average observation period of 25 days," said Lt. Col. Don C. Wakeman, Topeka, Kans., Chief of Medical Service of the hospital.

Starvation is manifested chiefly by marked loss of weight, which in some instances was more than 100 pounds. In addition to loss of weight, a number of other symptoms and signs result from malnutrition which are due to deficiencies of proteins or vitamins.

Treatment in milder cases consisted of feeding a high caloric and high vitamin-containing diet divided into six meals per day and giving supplementary vitamin preparations to those who presented evidence of specific vitamin deficiency states. The more severe cases were unable to tolerate sufficient quantity of food to allow recovery from feeding alone. In these cases, intravenous solutions (feeding by vein), common blood plasma and transfusions of whole blood were necessary to get the patients over the first stage and put them in a condition where food would be tolerated.

X-ray studies of patients with nausea, vomiting, diarrhea and intolerance to food revealed marked changes in the functions of the small intestines which resembled the disease known as "sprue." Under adequate treatment these changes showed considerable improvement within two weeks.

Blood plasma was especially valuable because one of the common effects of starvation is a decrease of blood plasma level and many of these symptoms of the deficiency are secondary to a depletion of proteins. A few units of plasma and several blood transfusions, supplemented by vitamin therapy, would produce sufficient improvement to enable the severe cases to tolerate food.

It is possible to have an irreversible state of malnutrition in which no treatment will be of any value. Such cases are rare. Only one death was reported in this category in over 1,100 cases admitted to the hospital.

As a result of starvation, an individual loses much of his resistance to infections. The incidence of infectious diseases was very high in the German prison camps and many of the liberated Americans had tuberculosis and jaundice. Some had rheumatic fever. Many had had diphtheria, and post-diphtheritic polyneuritis and myocarditis were common.

Although mental changes are considered to be common in pellagra, no severe mental disturbances which were a direct result of starvation were found.

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CHEMISTRY

Fungus Chemical Checks TB Germs in Test Tube

➤ DISCOVERY of still another fungus chemical which might be developed into a remedy against tuberculosis is announced by Joseph M. Kurung, of the New York State Hospital for Incipient Pulmonary Tuberculosis (*Science*, July 6).

The fungus substance definitely stops the growth of tuberculosis germs growing on culture medium in the laboratory. It withstands high temperatures well and keeps for several months at below freezing temperatures. Tests with mice show that it is relatively non-toxic, suggesting that it could be used safely as a remedy.

STRAWBERRY PATCH!—Plants growing out of the top and from holes in the sides of a barrel—this is the way to grow your own berries on your apartment room, your city backyard, in the center of your flower bed or at the kitchen door on your farm. Mrs. J. N. Newsom, of Virginia, is shown watering the vines by means of an open perforated pipe in the center. Planting can be done in the spring or fall. Pick whenever you see a ripe berry.

Before attempting to establish its value as a weapon against tuberculosis, Mr. Kurung believes the substance should be obtained in a more pure form and is now working on this purification.

The material was obtained from a strain of the fungus called *Aspergillus ustus*. Substances active against tuberculosis germs growing outside the body have been obtained from other fungi and molds, including *Aspergillus fumigatus*, *Actinomyces griseus* and one of the Penicillium group, Mr. Kurung points out.

None of these various antibiotics, as they are called, has yet been accepted as a remedy for tuberculosis. Scientists are still working to assess the ability of some of these substances to check the growth of tuberculosis germs in the human body without themselves causing any damage.

Science News Letter, July 21, 1945

Prunings of fruit trees should be burned or they may become sources of infestation.

CHEMISTRY

Penicillin Causes Changes In Blood Clotting

➤ DISCOVERY of a change in blood clotting caused by penicillin, pointing both to possible danger and possible further benefits from the mold chemical, is announced by Maj. Leon F. Moldavsky, Capt. William B. Hasselbrock and Lt. Carlos Cateno of Harmon General Hospital (*Science*, July 13). Private Darrell Goodwin gave technical assistance in the studies.

The danger is that of thrombus or clot formation in the veins of patients getting penicillin, especially with the recent tendency to use larger doses.

The benefit would be use of penicillin in bleeding disorders such as hemophilia, though that hereditary bleeders' disease is not mentioned in the report.

Penicillin, the Army group found, speeds coagulation of the blood to such an extent that sometimes blood taken from a patient for study clotted in the syringe before it could be expelled.

"Even more startling" they report, is the change caused in the nature of the blood clot itself when penicillin has been given. The blood clot does not retract. The blood itself is dark and exceedingly viscous in its flow. When coagulation is complete it appears solidified, looking like an artificially produced, solid thrombus or blood clot.

Science News Letter, July 21, 1945

ORDNANCE

Two Navy Laboratories At Pennsylvania State

➤ TWO permanent ordnance research laboratories for the U. S. Navy will be in operation at Pennsylvania State College by fall.

One of these will investigate underwater weapons and will continue Navy underwater sound research formerly carried on at Harvard University under the sponsorship of the Office of Scientific Research and Development. Dr. Eric A. Walker will direct this new laboratory and also head the Electrical Engineering Department of the College. Assistant directors will be A. N. Butz, Jr., R. R. Thompson, and Dr. Harvey Brooks, all now affiliated with the Harvard University Laboratory. Approximately 125 scientists, technicians, and clerks will be transferred from Cambridge to the new unit.

The laboratory will operate a new building on the campus, a station on Black Moshannon Lake 20 miles from State College, and a test station at Fort Lauderdale, Florida.

The Navy is also sponsoring a program on petroleum research that has been conducted in Pennsylvania State College's Petroleum Refining Laboratory for sixteen years. Dr. M. R. Fenske will continue as director, with more than 50 chemists, chemical engineers, and technicians on the staff.

Science News Letter, July 21, 1945

CHEMISTRY

Rubber Protected from Chemical Damage by Copper

➤ COPPER is still the best all-round conductor for electricity, and rubber the best insulator for copper wire. However, like many an otherwise advantageous human mating, this marriage is not a happy one: copper constantly subjects rubber to a kind of chemical nagging, causing it to deteriorate and also staining it if the insulation is light-colored.

To protect rubber against the ill effects of too-constant companionship with copper, Dr. Albert W. Meyer of Nutley, N. J., has developed a thin coating of a synthetic plastic to go over the wire before the rubber insulation is applied. Into this plastic is incorporated one of a number of organic amines, of which the phenylene diamines are typical and which have the capacity to absorb the chemical abuse that would otherwise cause the eventual breakdown of the rubber.

On this method of insulating the insulation, U. S. patent 2,379,978 has been granted to Dr. Meyer, who has assigned it to the United States Rubber Company.

Science News Letter, July 21, 1945

PUBLIC HEALTH

Blue Cross Opens National Enrollment

➤ THE BLUE Cross Plans for hospital and medical care prepayment opened a national enrollment office in New York on July 16. Object of this new feature is to help in the enrollment of branch office or branch plant employees of national firms in areas served by two or more Blue Cross organizations.

Such employees, under the new arrangement, may be enrolled even if the number does not meet the minimum group requirements of the enrolling plan. Transfer of membership of the employee and his family will be accepted in cases in which employees of a nationally enrolled firm move to another city.

Science News Letter, July 21, 1945

MEDICINE

Substance from Chest Causes Heart Disease

➤ THE RIDDLE of what causes one kind of heart disease, known medically as acute interstitial myocarditis of unknown etiology, may be on the way to solution as the result of a discovery made at the AAF Regional and Convalescent Hospital at Miami Beach, by Lt. Col. F. C. Helwig and Capt. E. C. H. Schmidt of the Army Medical Corps and reported in *Science* (July 13).

They have isolated a substance capable of causing in apes, mice, rabbits and guinea pigs a disease with heart damage "strikingly similar" to that of the acute myocarditis of unknown origin which attacks humans sporadically.

The substance, apparently not known previously, was obtained from the chest fluid and spleen of a chimpanzee that died suddenly at the Anthropoid Ape Foundation. A gibbon at the same foundation had died suddenly six weeks previously with almost identical symptoms and the same signs of heart damage.

The substance obtained from the chimp's chest and spleen after death and which caused myocarditis in small laboratory animals appears from the scientific description to be a virus, although the medical officers do not state that it is. It passes through filters as viruses do. It can be inoculated on and recovered from chick embryos. It is found in the nasal washings of inoculated animals. It produces the heart damage when introduced into the body by injection into the veins, into the brain, under the skin, into the peritoneum and by instillation into the nose.

Science News Letter, July 21, 1945

ELECTRONICS

Electronics Laboratory At Syracuse University

➤ A NEW Laboratory of Industrial Electronics has been established at the University of Syracuse which will give emphasis to the application of electronic tubes and related circuits in the field of industrial control and measurements. Both graduate and undergraduate courses will be given by the institution.

Science News Letter, July 21, 1945

FIELDS

GENETICS

Yeast Hybrids Produced To Improve Food Value

➤ HYBRID yeast species are the newest products of plant breeders' efforts. They have been bred for the same reason that induced the production of hybrid varieties of tomatoes, sweetcorn or any other of the more easily visible vegetables—to improve their usefulness in the human or farm-animal diet.

Yeast, taken either "raw" or processed, is usually eaten primarily for the sake of several vitamins of which it normally constitutes a highly concentrated source. Although the yeast plant consists of a single cell visible only through the microscope, yeasts are as individual in their characters as larger plants, and a number of botanically distinct species are recognized.

Some of these species, though good suppliers of certain vitamins, are poor or even completely lacking in others. For this reason Dr. Carl C. Lindegren and Gertrude Lindegren, botanists at Washington University in St. Louis, have interbred the various species, producing hybrids with more varied vitamin-producing capacities than any of the parents. They discuss their results in some detail in *Science* (July 13).

Science News Letter, July 21, 1945

AGRICULTURE

Quack Grass Has Possible Use in Animal Feeding

➤ QUACK GRASS or couch grass, notorious as an evil weed in America as well as in its native Europe, has a possible use in animal feeding, experiments reported in the science journal, *Nature* (June 2), indicate. The research was performed by W. King Wilson of the Harper Adams Agricultural College at Newport, Shropshire.

Quack grass spreads over the ground by means of quick-growing runner-like stems or rhizomes. It can be slowed, though not stopped, by pulling these loose with a rake and stacking them up to dry. But this of course involves labor costs, and no offsetting use has ever been suggested for the dead weed growths.

Mr. Wilson made chemical analyses of dried quack-grass rhizomes and found that the food substances in them compared favorably with those in ordinary hay. Then he substituted them for hay in the diet of a group of rabbits, and found that the animals throve at least as well as those of a similar group kept on hay.

Quack grass, like the vegetable criminal that it is, has a number of aliases, though they all sound more or less alike: quick grass, couch grass, twitch grass. To botanists the weed has only one name: *Agropyron repens.*

Science News Letter, July 21, 1945

CHEMISTRY

Jar Rings No Longer Give Taste of Rubber to Food

➤ HOMEMAKERS can use almost any type of red or black jar rubber on the market this season without fear that the food inside the jars will taste of rubber. Rings manufactured in 1945 will be practically free of odor and most of the older rings can be treated to prevent objectionable flavors.

The simplest treatment, reports Prof. Marion C. Pfund of Cornell University, is to boil one dozen well-washed rings for 15 minutes in one quart of water containing one tablespoonful of baking soda, or one teaspoonful of soap powder, or one-half an unpared medium-sized potato, sliced, or about the same amount of potato parings. After boiling, wash the rings again in clear hot water.

The rings should be treated the day before using. If the odor is still strong, boil the rings a second time, but use a different substance in the water from the first used. The rings are not injured, insuring a tight seal.

Widespread complaints during 1943 and 1944 about objectionable flavors in home-canned foods, traceable to the rubber rings, led to an investigation at the New York State College of Home Economics, Cornell University, financed by the New York State Emergency Food Commission. The main trouble this year, Prof. Pfund says, is that there is no way of withdrawing from the market rings that have already been distributed, some of which may have objectionable odors.

Since her investigation, she has been in touch with a group of manufacturers that represent more than 90% of the rubber-ring industry. At the instigation of the War Production Board, they have been working to overcome difficulties of making rings from re-claimed and synthetic rubber. Rings of black and red rubber that will not impart flavor to food are now being made.

Science News Letter, July 21, 1945

ENGINEERING

Automatic Conveyor System Cleans Airplane Engines

➤ USED ARMY airplane engine parts are cleaned of dirt, grease and carbon accumulated through thousands of hours of operation by the Air Technical Service Command at its Rome, N. Y. shops through the use of a new automatic conveyor system. Passing in continuous motion through solution tanks and spray washers, they are untouched by human hands during the cleaning process.

Aside from the overhead 954-foot-long conveyor driven by a two-horse-power electric motor, the principal elements of the system are four large tanks and three industrial spray washers. Engine parts as they come off the disassembly line are hung on the conveyor or placed in suspended wire baskets. External dirt and grease are flushed off first by high powered sprays of alkali solution, after which the parts pass slowly through three soak tanks and another washer which removes much of the accumulated carbon.

Then they continue into a double cleaning tank, and on into a five-stage washer. In these the final carbon is removed, an alkaline spray flushes off the fluids used, and a clear hot water spray provides final cleaning. Parts are dried by a blast of hot air.

Science News Letter, July 21, 1945

ASTRONOMY

Second Comet in 2 Months Discovered by du Toit

➤ FOR THE second time in just a day over two months, an astronomer named du Toit, on the staff of the Harvard Observatory at Bloemfontein, South Africa, has picked up a new comet. The discovery was made at 3:00 a.m., Greenwich time, on June 11, which is the equivalent of 11:00 p.m., EWT June 10, in the United States. The preceding du Toit comet was first observed on April 9.

The new du Toit comet is an inconspicuous object, of only tenth stellar magnitude, and thus invisible to the naked eye. Its position, in the southern hemisphere constellation of Sculptor, puts it out of reach of telescopes in this country.

Its position when discovered was in right ascension 1 hour 8 minutes, declination minus 20 degrees—celestial equivalents of longitude and latitude. A check on its motion showed that it was traveling fairly rapidly in a southwesterly direction.

Science News Letter, July 21, 1945

CHEMISTRY

Frocks from Feathers

Soft sweaters and fluffy white mittens woven of feather yarn will probably be the rage within a few years. The barbs and quills are used.

By MARTHA G. MORROW

➤ SOFT SWEATERS and fluffy white mittens woven of feather yarn will probably be the rage within a few years. Scarfs and belts knitted of yarn made from feather protein may some day delight the most fastidious.

More exciting materials made from the millions of chicken feathers, which are now thrown away or used as fertilizer, may result from two lines of research. One is concerned with the fluffy barbs of the feather, the other deals with the quill.

The fine feather barbs help make a delightful piece of fabric. When cut loose from the midrib of the quill, these bits of fluff may be bound together with a little wool, cotton or rayon, and woven into yarn.

Poultry feathers, which contain a protein material, are being studied, as a possible raw material from which synthetic fibers can be made. The barbs are useless in this work and must be stripped away.

Approximately 100,000,000 pounds of chicken feathers, left from preparing friers and broilers for market, are wasted each year. Many other feathers remaining after ducks, turkeys and other fowl have been plucked are ordinarily thrown away or used as fertilizer. So scientists of the U. S. Department of Agriculture are busy trying to develop ways of preserving and using this waste material. Fabrics with definite eye appeal, long wear and specialized uses may result.

Wet feathers normally decompose too rapidly to be sent to a central place for processing. A way had to be found to ship feathers, wet and frequently covered with blood, from chicken-dressing plants to processing houses at reasonable cost.

Feathers "Pickled"

By "pickling" the feathers in a salt and hydrochloric acid solution, it was found that they can be preserved for several weeks. This treatment, which does not injure their fluffiness, enables them to reach the processing houses in good condition.

A process for "mincing" feathers has been developed by Dr. John I. Hardy of the Beltsville, Md., Research Center. After the feathers have been dried and cleaned, they are put into a hammer mill, where the barbs are broken away from the midribs and cut into short pieces. These cling to one another with thousands of microscopic hooks, forming a loose, fluffy mass.

The barbs are separated from the coarser midribs by blowing them upward in a tall tower. The light, fluffy portions float up to the top where they are collected in a bag. The coarser bits stay at the bottom and are at present discarded.

The soft, feathery bits are thoroughly mixed in a carding machine with a binder such as wool or cotton before being spun into yarn. Though themselves too short to make a strong fiber, when firmly anchored in wool, cotton or rayon, the bits make a fine, warm fabric.

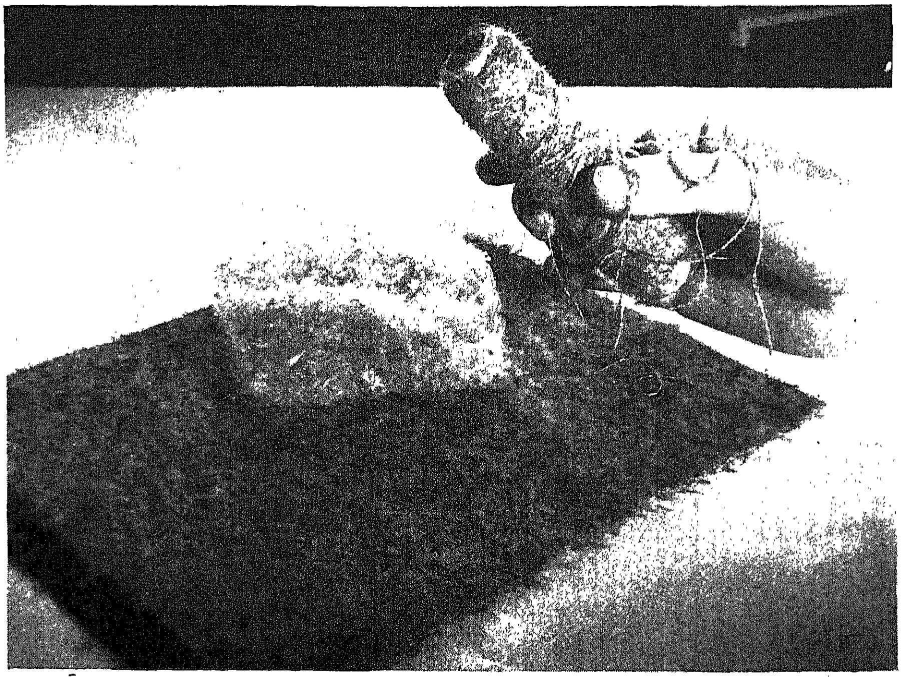
When washed, the feathers retain their fluffiness and do not shrink. Feeling not unlike angora wool, the resulting material is pleasing to the touch.

Fibers resembling silk and wool in some of their properties have been made experimentally from the protein of chicken feathers under the direction of Dr. Harold P. Lundgren of the Western Regional Research Laboratory at Albany, Calif. The extent to which the fiber can be developed commercially is at this stage unknown, but prospects are definitely promising.

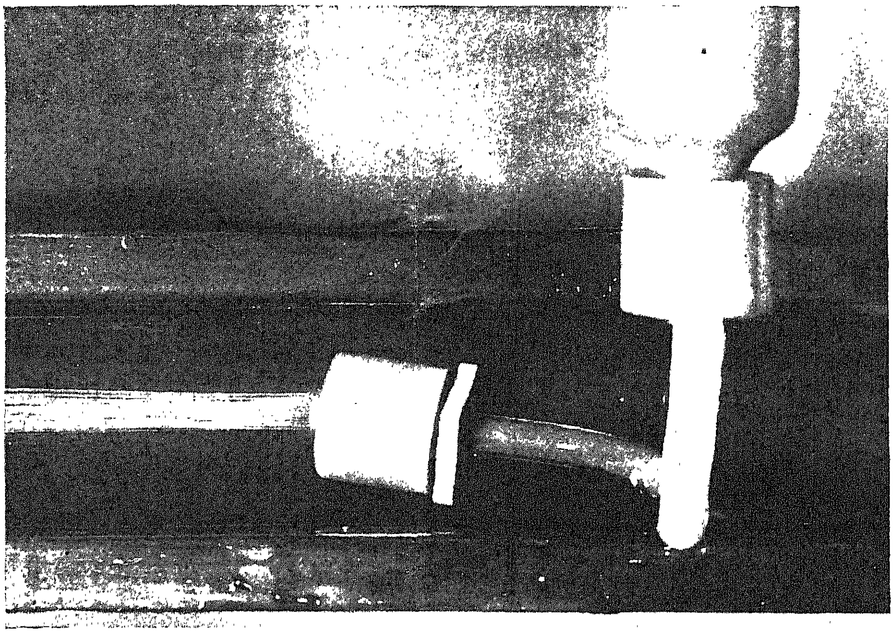
The object of the research is to liberate the long-chain protein molecules of the keratin of feathers and to re-orient them and recombine them so as to produce a fiber.

Treating the feathers with synthetic detergents such as alkyl benzenesulfonate, along with a reducing agent, has proved most successful. The detergent causes little if any damage to the chains themselves; it breaks the bonds which hold them together and attaches itself laterally along the side of the chains. It thus in a sense serves as a lubricant, permitting better control in handling the bulky protein chains.

Fibers can be made from the protein-detergent solutions in one of two ways.



FEATHER FABRICS—A pile of barbs, yarn made by binding the soft bits together with a little wool, and a piece of feather cloth are shown here.



BARNYARD PRODUCE—Fibers made from the protein of chicken feathers are drawn from a spinneret at the Western Regional Research Laboratory where Dr. H. P. Lundgren's research is being conducted.

Inorganic salt can be used to form a precipitate of subsequent drawing into a fiber, or the solution can be passed through a fine-holed nozzle into a coagulating bath where it hardens.

When the material is separated from the liquid into solid form by the use of salt, it is either slimy or soft and flaky, depending on the proportion of detergent used. The material that precipitates to the bottom, if not too slimy, can be drawn into fibers by hand.

The sticky solution may also be forced through the holes of a spinneret similar to those used in making rayon fibers. Somewhat like the nozzle of a bathroom spray, the spinneret has holes which are only three-thousandths of an inch in diameter. Upon being squirted from the spinneret, the liquid is forced into a salt bath where the fibers solidify.

Stretched and Reeled

The resulting fibers, like nylon, can be stretched and reeled. Drawn under live steam, the fibers can be stretched to over three or four times their original length.

Fibers have been made which compare favorably in strength with synthetic fibers made from casein and soybean. Chicken-feather fibers have been prepared having dry strength greater than wool and practically as strong as cotton and rayon. Along with the increased strength, the fibers also gain water resistance. Stretching, however, reduces the elasticity of the fiber.

Much study remains to be done on chicken-feather keratin before its full usefulness as a fiber can be realized. But cloth from minced chicken feather barbs isn't just a dream: it's a reality. Soft, downy material has already been made from the light, fluffy portion of feathers, so don't be surprised to see it soon in some exclusive shops.

Science News Letter, July 21, 1945

PUBLIC HEALTH

No Increase in Polio During Week of July 7

➤ AS IF to confirm assurances by health authorities that infantile paralysis gives no signs yet of becoming epidemic this season, the total number of cases throughout the nation remained practically stationary during the week ending July 7.

The number reported for that week to the U. S. Public Health Service was 154. The total for the previous week was 155. For the first week in July, 1944, the total was 288.

Texas, where the greatest concentration of cases so far has occurred, reported 21 cases the week of July 7, compared to 54 the previous week. Tennessee, New York and California reported some increases.

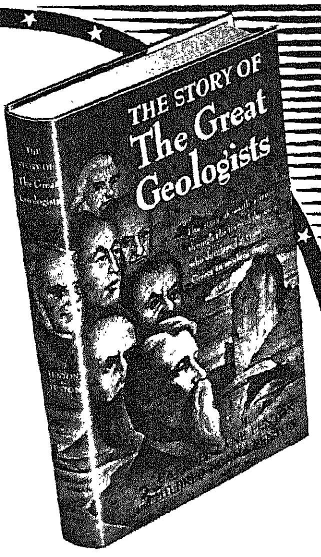
Science News Letter, July 21, 1945

MINERALOGY

Mineral Rehabilitation Planned for New Jersey

➤ USE as a water softener of New Jersey marl or greensand, formerly important as a fertilizer, has inspired a program of rehabilitation and expansion for New Jersey's mineral industry which has dwindled recently. A new bureau of mineral research at Rutgers University, headed by Dr. Alfred K. Snelgrove, formerly of Michigan College of Mining and Technology, will conduct the study.

Science News Letter, July 21, 1945



These men discovered the Earth

THE STORY OF
The Great Geologists

By Carroll Lane Fenton and Mildred Adams Fenton

TWO outstanding scientists tell the fascinating story of the development of earth science, through the lives of 35 great geologists, interrelating the account of their scientific work with the story of their lives. With a popular, yet scientifically accurate approach, the authors show the relationship between geological discoveries and the historical conditions that nourished them.

At your bookseller's, $3.50

DOUBLEDAY, DORAN

Do You Know?

The more nearly pure *water* is, the less it conducts electricity.

The cells of a *honeycomb* are seldom actually symmetrical.

The average life of a 60-watt incandescent *bulb* is 1,000 hours of burning.

Poison ivy, poison oak, and poison sumac all contain *urushiol,* which is the irritant.

Sweet potatoes are not as exacting in their soil requirements as white potatoes and are therefore probably easier to grow.

Freon - 12, difluorodichloromethane, used for several years as a refrigerant in quick-freezing units, was little known to the public until employed in insect-killing bombs by the armed services.

Fabrication of hard, *heat-resistant glass* is now carried out by the use of radio-frequency electric current passing through the glass between two gas flames on opposite sides of the glass part.

The nation's newest national park, *Big Bend* in the Chisos country of Texas, is one of the most important geological sections of America because of the various geological stages passed by the area in formation.

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MEDICINE

Boric Acid Treatment

Is recommended as the only safe home remedy for athlete's foot by the A.M.A. Three new remedies get OK for use by doctors.

➤ BORIC ACID powder is recommended by the American Medical Association as a safe remedy, and the only safe home remedy, for athlete's foot.

The recommendation is given in a report by Dr. Fred R. Weidman, University of Pennsylvania School of Medicine, Dr. Chester W. Emmons, U. S. National Institute of Health, Dr. Joseph G. Hopkins, Columbia University College of Physicians and Surgeons, and Dr. George M. Lewis, Cornell University Medical School. Since the report covers studies made for the medical association's council on pharmacy and chemistry and is published by the council, its recommendations can probably be taken as coming from the association as well as the scientists reporting.

This "venture" into "the dangerous field of self-treatment" is made in recognition of the fact that, although self-treatment is considered unsafe, a large section of the public persists in treating many of its own ailments, at least in the early stages.

Three relatively new remedies, sodium propionate, undecylenic acid and Cresatin (metacresylacetate), are reported as useful for treatment given by physicians.

Hygiene of the feet is stated to be of paramount importance both in prevention and treatment of athlete's foot. Foot baths of hypochlorite and hyposulfite, however, are "becoming discredited."

Athlete's foot or, more specifically, fungus infection of the skin, is not found to predispose to skin trouble from contact with irritating substances such as industrial chemicals.

Although widely prevalent, with probably more than half the industrial workers of the country affected, athlete's foot has resulted in little manpower loss.

Self-treatment of athlete's foot, the report warns, should be limited to mild sores between the toes when the condition is limited to scaliness and perhaps mild redness and cracking. Considerable redness, moisture, formation of pimple-like bumps called pustules, or pain call for treatment by a physician and a physician only, it is emphasized.

If two weeks of the boric acid powder plus certain prophylactic measures do not result in improvement, the patient should consult a physician.

The patient is warned "under no circumstances" to "yield to the well meant recommendations of friends and to advertisements.

"Preparations containing iodine, mercury or sulfur are particularly dangerous and the sulfonamides are notorious because they so frequently sensitize the individual to sulfonamide drugs which may be imperatively indicated later for a really serious ailment."

Prophylaxis for athlete's foot is given as follows:

1. Keep the feet clean and dry, with special attention to places between the toes. Dry these carefully but not so hard as to irritate the skin.
2. Air shoes and socks when not in use.
3. Under special conditions, keep the feet elevated when at rest (where the conditions predispose to intertrigo, as with marching soldiers).
4. Shoes should be selected that are as light and well aerated as is compatible with working conditions.
5. A dusting powder consisting of 10% boric acid in powdered talc should be dusted on the feet and between the toes every night and morning.

Science News Letter, July 21, 1945

CHEMISTRY

Germs Killed by Burdock Leaves Steeped in Water

➤ WATER-STEEPED green leaves of burdock, a common wayside weed used as medicine by the ancients, successfully kill certain bacteria, Dr. Chester J. Cavallito, Dr. John H. Bailey and Dr. Frederick K. Kirchner of Winthrop Chemical Co., Inc., state in the *Journal of the American Chemical Society.* Not as active as some of the other antibiotics, burdock's ability to kill germs is of particular interest because of the plentiful supply of this weed and because the toxicity to mice is relatively low.

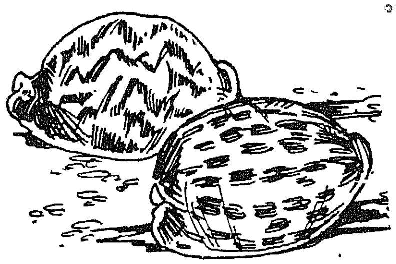
Science News Letter, July 21, 1945

The sometimes odoriferous *skunk* is a valuable night worker for the gardener because he lives largely on garden pests.

ANTHROPOLOGY

NATURE RAMBLINGS

by Frank Thone



Odd Coins

➤ WHAT an assortment of things mankind has used (and still uses) for monetary purposes!

To the old gag question, "What'll we use for money?" the human race has apparently chosen as a snappy come-back, "Oh, 'most anything!"

You can hardly name a substance or commodity that has not been used as a medium of exchange. This does not mean as objects of barter (though the dividing line between bartering and buying with money is hard to draw) but as conventionally accepted, or even legally defined, coin of the realm.

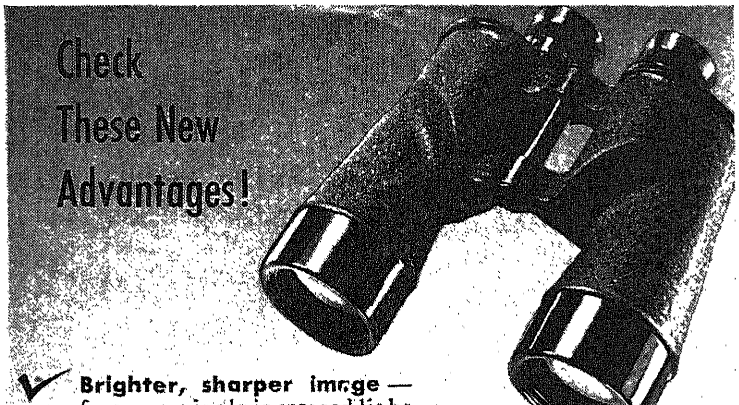
Seashells of many kinds, either whole or cut up into disks, beads or other processed articles, have been used as money in practically all parts of the world. The wampum of our American Indians, which had come to be a rather highly standardized basis of trade before the arrival of the white man, was made of very tiny shell beads—perhaps the most elaborately processed of all shell "coins." Contrast with that the use of unmodified cowrie shells in the Pacific islands—objects of great beauty in themselves, with the added value of always being scarce.

Small boys, swapping knives, may seem to be indulging in pure barter. But iron knives are standard coin in large parts of Africa right now. Knife money seems to have been very widely current in past times. Some of the earliest coinage in China was in terms of knives. The antiquity of the practice is well demonstrated by the fact that the knives, at first usable as tools, then merely knife-shaped flat pieces of metal, were always made of bronze or brass, never of iron.

The Chinese knife money had round-ended handles with holes bored in them for the passage of a string. The present-day holed "cash," the smallest of small change in China, are said to be the last survivors of these round-ended knife handles. Some of the African knife money presents an interesting parallel, for it consists of somewhat exaggerated handles with hardly a trace of the blades. Primitive African money, however, is of iron: Negroes passed from the use of stone directly to that of iron, without any intervening Bronze Age. They may have been the world's first blacksmiths.

Our own insistence on gold as the only "real" money may have roots just as primitive. We commonly say that gold is so highly valued because of its rarity, its beauty, its resistance to oxidation. But it is highly probable that nugget gold was the first of all metals to be used by human beings, antedating even copper. Isn't it at least likely that this also was a factor in setting it up in the esteem of all succeeding generations?

Science News Letter, July 21, 1945



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✓ **Completely waterproof**—can be immersed in sea water without harm.

✓ **New lens cement**—stands extreme heat or cold.

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✓ **New prism mounting**—for positive permanent alignment.

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These advantages will be available on postwar binoculars for civilian use.

Official U. S. Navy Photo

NAVY MEN DEPEND ON PRECISION BINOCULARS . . . Guarding the lives of hundreds of men, these advance lookouts rely on the superior performance of high quality binoculars. They know that a far-away object on the horizon can be quickly identified with these powerful glasses. The name Bausch & Lomb has long stood for such *optical precision.* The world's finest binocular today is *Bausch & Lomb.*

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• Books of the Week •

➤ IF YOU WANT TO KNOW what part hunches and lucky accidents have played in scientific discoveries, how a scientist thinks and feels and works, and what makes a scientist, read THE WAY OF AN INVESTIGATOR, by Walter B. Cannon (*Norton*, $3). Young men and women embarking on careers in science particularly will find much in this book to inspire and guide them.

Science News Letter, July 21, 1945

• Just Off the Press •

BOOKS, PUBLICATIONS, AND PATENTS OF THE BATTELLE MEMORIAL INSTITUTE STAFF—Thelma R. Reinberg, comp.—*Battelle Memorial Institute*, paper, 72 p., illus., free.

CHARACTER-ANALYSIS: Principles and Technique for Psychoanalysts in Practice and in Training—Wilhelm Reich—*Orgone Inst. Press*, 328 p., $4.50. A technical book on psychoanalysis. 2nd ed., trans. by Theodore P. Wolfe.

THE CHEMISTRY OF ACETYLENE—Julius A. Nieuwland and Richard R. Vogt—*Reinhold*, 219 p., illus., $4. Amer. Chem. Soc. monograph series.

GENETICS—Edgar Altenburg—*Holt*, 452 p., illus., $3.20. A college textbook.

A GUIDE ON ALCOHOLISM FOR SOCIAL WORKERS—Robert V. Seliger and Victoria Cranford—*Alcoholism Pub.*, paper, 94 p., $2. War ed., first printing.

REDUCING DAMAGE TO EGGS AND EGG CASES—U. S. Dept. of Agriculture—*Supt. of Documents*, paper, 24 p., illus., 10 cents. Misc. Pub. No. 564.

STANOLUBE HD—*Standard Oil Co.*, paper, 43 p., illus., free. The meaning of HD in a superior type motor oil for heavy duty service. Technical Bulletin No. 45—1.

THE STORY OF WAR WEAPONS—Marshall McClintock—*Lippincott*, 173 p., illus., $2.50. A Stokes book for boys and girls.

STRAIGHT TALK FOR DISABLED VETERANS—Edna Yost and Lillian M. Gilbreth—*Public Affairs Press*, paper, 32 p., illus., 10 cents. Public Affairs Pamphlet No. 106.

TEXTBOOK OF NEUROPATHOLOGY—Arthur Weil—*Grune*, 356 p., illus., $5.50. 2nd ed, revised and enlarged. A textbook and reference manual.

YOUR PERSONAL PLANE—John Paul Andrews—*Duell*, 230 p., illus., $2.50. An introduction by Henry A. Wallace, and an appendix giving the CAA directory of airports.

Science News Letter, July 21, 1945

ENGINEERING

Cubes of Coal Wrapped In Neat Paper Bundles

➤ CUBES of coal, neatly wrapped in paper, may eventually be sold at the grocery or filling station. Specially blended coal cubes in Philadelphia are already appearing in packages weighing only a trifle more than seven pounds, but at present are delivered only in ton lots, and principally through dealers.

Known as White Glove Packaged Fuel because of their cleanliness, the three-inch cubes are made from anthracite and bituminous fines, small particles of top-grade coal, held together by an oil-base binder.

Fuel packaged in such a convenient size does away with the coal bin and its attendant dirt. Stacked neatly next to the furnace, stove or fireplace, the package containing six cubes may be thrown into the fire, wrapping and all. It burns to a minimum of fine white ash and does not form clinkers.

Science News Letter, July 21, 1945

PHYSICS

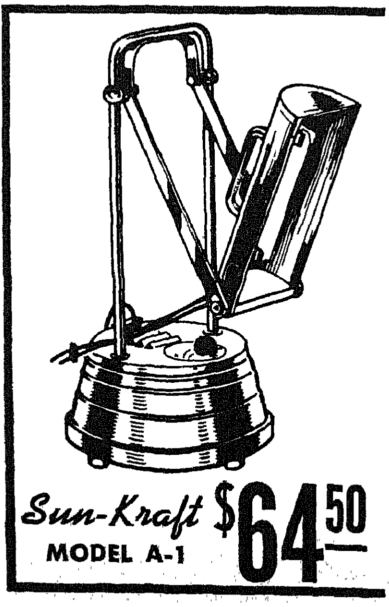
Rocket Propulsion Powder Inspected by X-Rays

➤ SO-CALLED grains of rocket-propulsion powder, in reality sticks of a highly combustible material that provide the gas to drive the jet-propelled war weapon, are successfully and rapidly inspected for flaws by X-ray equipment, it is now revealed. These extruded sticks of powder, made from a paste-like mixture, sometimes contain airpockets and, if used, may cause the rocket to overshoot or fall short of its target.

A regular industrial X-ray equipment, made by Westinghouse, is proving highly satisfactory at the plant of the Hercules Powder Company, where the rocket grains are made. The grains are passed through the X-ray apparatus and a film record is made on which flaws or air-pockets may be easily seen. Imperfect sticks are rejected.

Rockets employ a jet of expanding gas, escaping through a narrow aperture at the rear, for their forward push. The gas is generated by the ignition of a powder charge carried in the center section of the rocket, just back of its explosive head. A relatively slow-burning fire is necessary to generate the gas in a smooth, even flow with no variations in pressure. It is for this reason that the grains must be without air pockets.

Science News Letter, July 21, 1945



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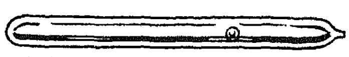
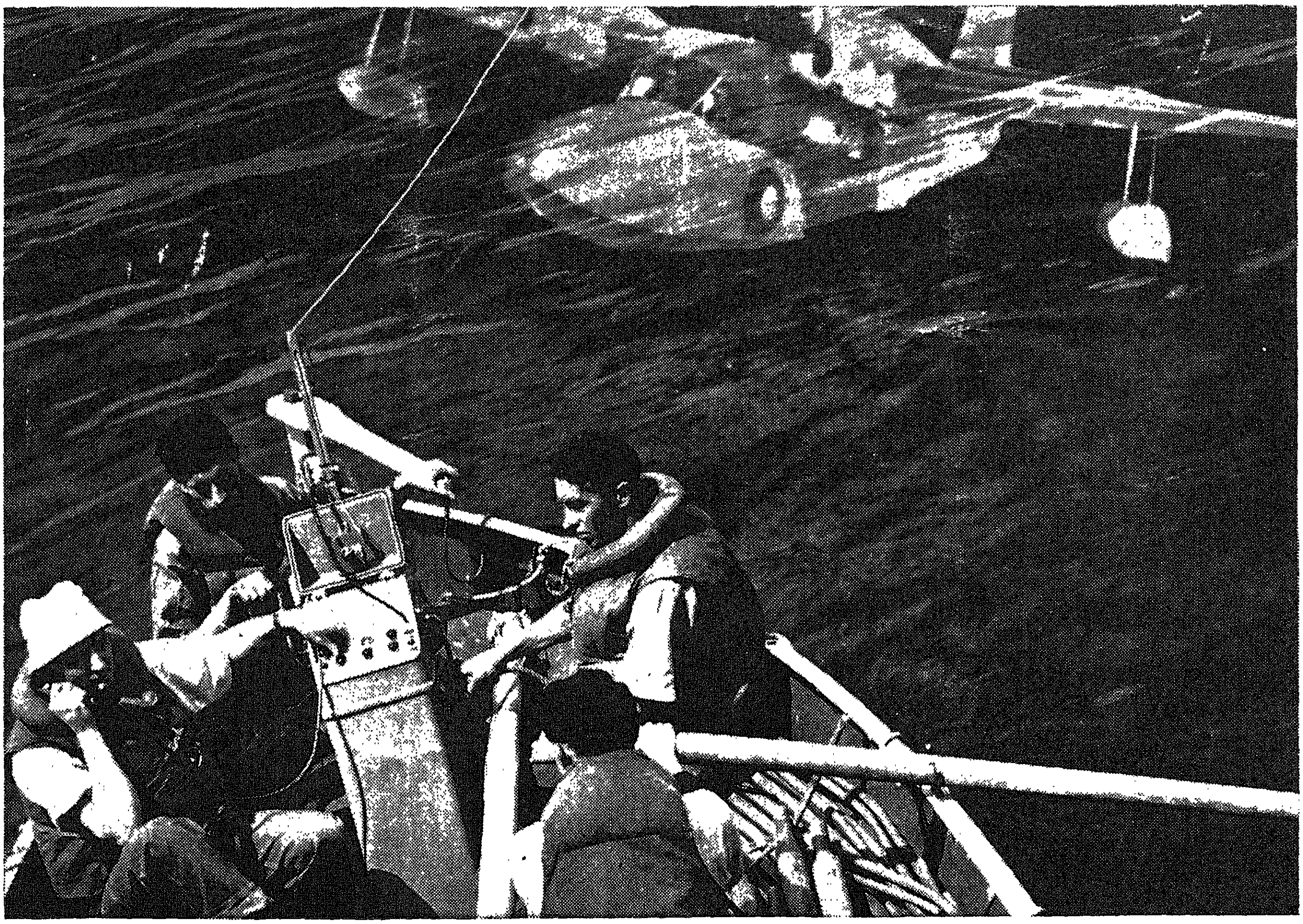
THE DIFFERENCE BETWEEN Sun-Kraft QUARTZ ULTRAVIOLET RAY TUBE AND CONVENTIONAL TYPE QUARTZ TUBE



Sun-Kraft, "No filament, burn-out-proof" super transparent quartz tube can not burn out, can not fog, develop black spots or weaken in ultraviolet radiation. Costly replacements are entirely eliminated.

Conventional type electrode or filament activated tube. Deteriorates quickly because of the fused in metal. It will develop black spots fast, reducing ultraviolet radiation and eventually burning out entirely, necessitating costly replacements.

SEND FOR FREE ILLUSTRATED BOOKLET "HOW TO USE YOUR SUN-KRAFT"



With the new RCA lifeboat radio, shipwrecks need no longer take a terrible toll of lives.

A two-way radiophone—for lifeboats!

Here's when a telephone comes in rather handy . . . when you can "get your party" and hear "We'll be there to get you in a couple of hours!"

With the new RCA compact lifeboat radio, that's exactly what happens. A kite, or a balloon, takes the antenna up 300 feet.

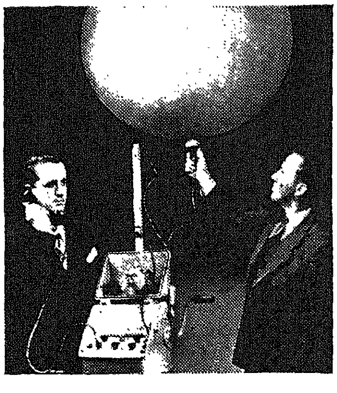
Turn the power-generating cranks and out goes an SOS—along with a direction-finder beam so shore stations can figure your exact location.

But even more amazing, shipwrecked mariners can talk with the men on their way to the rescue. They can "pick up" ships, airplanes, and that wonderful place called "land"—even if it's 1000 miles away!

Endless research, such as went into developing this lifeboat radio, goes into all RCA products.

And when you buy an RCA Victor radio, or television set or Victrola, you enjoy a unique pride of ownership in knowing that you possess one of the finest instruments of its kind that science has achieved.

Radio Corporation of America, RCA Building, Radio City, New York 20. • *Listen to The RCA Show, Sundays, 4:30 P.M., E. W. T., over the NBC Network.*



Joseph McDonald and Donald Kolb (holding balloon) are the Radiomarine engineers who developed this lifeboat radio. Here is the balloon that is inflated with helium and carries the antenna as high as 300 feet into the air.

RCA

RADIO CORPORATION of AMERICA

New Machines and Gadgets

⚙ *WIND DIRECTION and velocity automatic recorder includes an electric generator, operated by the ordinary cup anemometer, the output of which varies with the speed. The rotor loop in the generator turns with the wind vane, its position being recorded electrically.*

Science News Letter, July 21, 1945

⚙ *SPECIAL RADIO receivers, available only to service men overseas, are strong, light, compact and resistant to fungi and corrosion. Control panels are recessed with nothing protruding. The antennae reel into the back but can be unreeled quickly for use. The receivers contain their own batteries, either AC or DC.*

Science News Letter, July 21, 1945

⚙ *PENCIL-POINTING device is a small tray for the desk with steel file set lengthwise in its center, the upper ridge of the file projecting above the tray. The edge of the tray forms a rest for the pencil while the point is pushed backward and forward against the file. The tray catches the debris.*

Science News Letter, July 21, 1945

⚙ *COLLAPSIBLE crib for a baby has hinged joints in its frame so that it can be folded quickly into a compact unit for carrying or storage in an automobile trunk. The body is canvas and can be easily attached to the frame when opened.*

Science News Letter, July 21, 1945

⚙ *LABORATORY mixer is made by fitting a mason jar top in a hole in the table top. The jar, containing materials to be mixed, is screwed in place as shown in the picture. The shaft of the electric mixer projects through the jar top, as does also a funnel for adding additional material.*

Science News Letter, July 21, 1945

⚙ *MOISTURE-ABSORBING device for a pipe-stem, cigar or cigarette holder, includes a removable absorbing material, round in shape but tapering from near its center toward the ends. The pipestem, the size of a cigarette, is held in place in a metal clasp with two spaced arms.*

Science News Letter, July 21, 1945

⚙ *COMBINATION ASHTRAY and match-holder, pocket-size, consists of two hinged parts, one to hold a card of matches, the other the ashes and cigarette butts. An inside wall on the ash receiver prevents the contents from spilling, while a slide on it may be opened to insert ashes and butts.*

Science News Letter, July 21, 1945

⚙ *HOIST, jack and wire stretcher, all in one, has the ordinary stand with a flat base, and a hook at the top so that it can be suspended. The movable part is a long chain with a hook at one end and with links that fit the gears of a wheel rotated by a lever.*

Science News Letter, July 21, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 268.*

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IENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • JULY 28, 1945

No Recoil

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A SCIENCE SERVICE PUBLICATION

GENERAL SCIENCE

Science Reconversion

Senate subcommittee on war mobilization report makes recommendations to keep up the necessary scientific work for national welfare.

➤ TO AID the war-to-peace reconversion of scientific research and sustain the research and development necessary to national defense, health and medical care, industry, agriculture and business, the Senate's subcommittee on war mobilization headed by Sen. Harley M. Kilgore, of West Virginia, recommends in a report that Congress create a National Science Foundation as an independent governmental agency.

Federal research expenditures rose to $706,000,000 in 1944, a ten-fold increase over 1938, the report states, while the total research investment by private organizations and government was over $800,000,000. Before the war, the nation was spending between $300,000,000 and $400,000,000 a year for research, about a fifth of it governmental. Thus there would be a gap of from $400,000,000 to $500,000,000 if we revert to the prewar rate of research.

The proposed new central scientific agency of the government would take up some of this gap through use of public funds as well as "coordinate all such federally supported research and development work, utilizing so far as possible the existing resources of public and private research organizations, particularly nonprofit educational institutions and research foundations."

The National Science Foundation would be headed by a director appointed by the President and confirmed by the Senate. Fund allocations and other actions would be approved by a National Science Board consisting of the director as chairman, eight Presidentially appointed members at large, and the Secretaries of War, Navy, Interior, Agriculture, Commerce, and Labor, the Attorney General, and the head of the Federal Security Agency or their representatives.

At least 20% of the annual research appropriations would be reserved for each of three fields: National defense, health and medical care, and basic sciences. At least half of the funds would be earmarked for non-profit educational and research institutions.

The new foundation would not itself perform research and development work, but would make funds available to public and private organizations already equipped and staffed.

The foundation would also be empowered to grant fellowships and scholarships in various fields of science in order to "discover and develop scientific talent, particularly in American youth."

"To protect the taxpayer's interest," the report states, "all research and development projects financed in whole or in part by the federal government should be undertaken only upon the condition that any invention or discovery resulting would become the property of the United States." The foundation would grant without charge nonexclusive licenses to persons or organizations wishing to use any such invention, discovery, patent or patent right.

Science News Letter, July 28, 1945

MEDICINE

Life-Restoring Method

➤ THE CLAIM that life has been restored in 12 of 51 fatally wounded Red Army officers and men is reported by Sergei Belayev in the *American Review of Soviet Medicine* (June).

The method used consisted in supplying oxygen to the lungs directly by a pulmotor and injecting blood not only into a vein but also into an artery of the arm in the direction of the heart. This is said to restore nourishment to the heart muscle.

The method was developed by Prof. V. A. Negovski, director of the laboratory of experimental physiology at the All-Union Institute of Experimental Medicine.

The case of Valentin Cherepanov, private in the Red Army, now alive after being declared dead by a physician, is reported in some detail.

He had been seriously wounded in the thigh and was brought to a field hospital unconscious and in a serious state. He was placed immediately on the operating table but his condition grew worse. Heart action and breathing ceased and reflexes were absent. The surgeon's entry in the case history was:

"Death following shock and acute hemorrhage on March 3, 1944, at 14:41."

Three and one-half minutes later a specially trained group of doctors went to work on the soldier's body. One minute later, Mr. Belayev reports, his heart started to beat and after three minutes breathing started. Within an hour he had recovered consciousness, opened his eyes when his name was called, answered questions and asked for a drink of water. Today he feels perfectly well but is under observation at the All-Union Institute.

Less fortunate were some of the other 51 on whom the Negovski method was tried. In some life was restored but lasted only a few hours or days.

Science News Letter, July 28, 1945

CHEMISTRY

Wax-Free Lubricant Has Unusual Advantages

➤ A NEW non-petroleum lubricant for automobile, aircraft and other internal combustion engines has been developed and tested that is claimed to have unusual advantages over mineral oil, particularly in cold weather. Its properties are quite different in many respects from oils derived from petroleum. It is wax-free and can be made to any desired viscosity.

The lubricant is a product of Carbide and Carbon Chemicals Corporation and is now being produced in commercial quantities. Its use in engines has been studied for several years in a large number of vehicles. Large quantities are in use in military equipment, and, at the present time, sale of the material is limited to war uses.

No petroleum oils are contained in the new lubricant. It has a density approximating that of water. It is characterized by low change in viscosity with change of temperature. Carbon residue values are very low. Sludge and varnish formation in the engine is practically eliminated when the new lubricant is used, and wear of moving parts is in line with wear experience with ordinary mineral oils.

Science News Letter, July 28, 1945

Tetanus antitoxin, used to prevent lockjaw, is an antibody obtained from the blood of horses; unless renewed it gives the human body only ten days' protection.

GENERAL SCIENCE

Research Agency Planned

OSRD responds to request of President Roosevelt by urging new National Research Foundation to aid research and scholarships for potential scientists.

On November 17, 1944, President Franklin D. Roosevelt wrote to Dr. Vannevar Bush, director of the Office of Scientific Research and Development, requesting recommendations on four points. The first had to do with the release of results of scientific research made during wartime. The second referred to organization of a program for continuing the war against disease. The third dealt with possible government aid to the research of public and private organizations. And the fourth was concerned with a program for discovering and developing scientific talent in American youth "so that the continuing future of scientific research in this country may be assured."

The following is a summary of the report containing the requested recommendations. Dr. Bush was aided by four committees headed respectively by Dr. W. W. Palmer, Columbia University; Dr. Isaiah Bowman, Johns Hopkins University; Henry Allen Moe, Guggenheim Memorial Foundation; and Dr. Irvin Stewart, National Research Council.

By DR. VANNEVAR BUSH

Director, Office of Scientific Research and Development

➤ PROGRESS in the war against disease depends upon a flow of new scientific knowledge. New products, new industries, and more jobs require continuous additions to knowledge of the laws of nature, and the application of that knowledge to practical purposes. Similarly, our defense against aggression demands new knowledge so that we can develop new and improved weapons. This essential, new knowledge can be obtained only through basic scientific research.

Science can be effective in the national welfare only as a member of a team, whether the conditions be peace or war. But without scientific progress no amount of achievement in other directions can insure our health, prosperity, and security as a nation in the modern world.

For War Against Disease

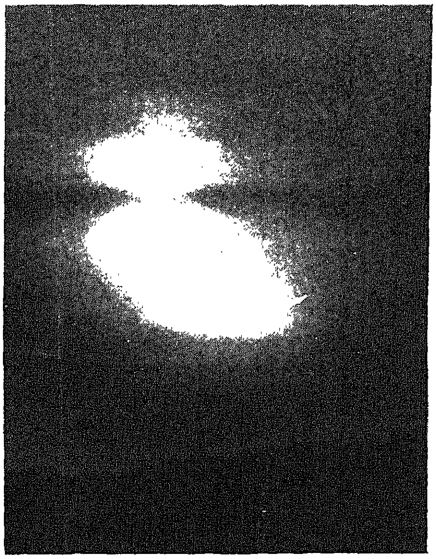
We have taken great strides in the war against disease. The death rate for all diseases in the Army, including overseas forces, has been reduced from 14.1 per thousand in the last war to 0.6 per thousand in this war. In the last 40 years life expectancy has increased from 49 to 65 years, largely as a consequence of the reduction in the death rates of infants and children. But we are far from the goal. The annual deaths from one or two diseases far exceed the total number of American lives lost in battle during this war. A large fraction of these deaths in our civilian population cut short the useful lives of our citizens. Approximately 7,000,000 persons in the United States are mentally ill and their care costs the public over $175,000,000 a year. Clearly much illness remains for which adequate means of prevention and cure are not yet known.

The responsibility for basic research in medicine and the underlying sciences, so essential to progress in the war against disease, falls primarily upon the medical schools and universities. Yet we find that the traditional sources of support for medical research in the medical schools and universities, largely endowment income, foundation grants, and private donations, are diminishing and there is no immediate prospect of a change in this trend. Meanwhile, the cost of medical research has been rising. If we are to maintain the progress in medicine which has marked the last 25 years, the Government should extend financial support to basic medical research in the medical schools and in universities.

For Our National Security

The bitter and dangerous battle against the U-boat was a battle of scientific techniques—and our margin of success was dangerously small. The new eyes which radar has supplied can sometimes be blinded by new scientific developments. V-2 was countered only by capture of the launching sites.

We cannot again rely on our allies to hold off the enemy while we struggle to catch up. There must be more—and more adequate—military research in peacetime. It is essential that the civilian scientists continue in peacetime some portion of those contributions to national security which they have made so effectively during the war. This can best be done through a civilian-controlled organization with close liaison with the Army and Navy, but with funds direct from Congress, and the clear power to initiate military research which will supplement and strengthen that carried on directly under the control of the Army and Navy.



NOT THE MOON!—This is the eighty-five percent eclipsed sun as it rose over a ridge of the east Rocky Mountains near Butte, Montana, on July 9. This picture was taken with a ten-foot camera. Photograph from Peter A. Leavens and George V. Plachy, New York Amateur Astronomers' Association-Sperry Gyroscope Company expedition.

And for Public Welfare

One of our hopes is that after the war there will be full employment. To reach that goal the full creative and productive energies of the American people must be released. To create more jobs we must make new and better and cheaper products. We want plenty of new, vigorous enterprises. But new products and processes are not born full-grown. They are founded on new principles and new conceptions which in turn result from basic scientific research. Basic scientific research is scientific capital. Moreover, we cannot any longer depend upon Europe as a major source of this scientific capital. Clearly, more and better scientific research is one essential to the achievement of our goal of full employment.

How do we increase this scientific capital? First, we must have plenty of men and women trained in science, for upon them depends both the creation of new knowledge and its application to practical purposes. Second, we must strengthen the centers of basic research which are principally the colleges, uni-

Science—Endless Frontier

"New frontiers of the mind are before us, and if they are pioneered with the same vision, boldness, and drive with which we have waged this war we can create a fuller and more fruitful employment and a fuller and more fruitful life."—

FRANKLIN D. ROOSEVELT.
November 17, 1944.

versities, and research institutes. These institutions provide the environment which is most conducive to the creation of new scientific knowledge and least under pressure for immediate, tangible results. With some notable exceptions, most research in industry and in Government involves application of existing scientific knowledge to practical problems. It is only the colleges, universities, and a few research institutes that devote most of their research efforts to expanding the frontiers of knowledge.

Expenditures for scientific research by industry and Government increased from $140,000,000 in 1930 to $309,000,000 in 1940. Those for the colleges and universities increased from $20,000,000 to $31,000,000, while those for the research institutes declined from $5,200,000 to $4,500,000 during the same period. If the colleges, universities, and research institutes are to meet the rapidly increasing demands of industry and Government for new scientific knowledge, their basic research should be strengthened by use of public funds.

For science to serve as a powerful factor in our national welfare, applied research both in Government and in industry must be vigorous. To improve the quality of scientific research within the Government, steps should be taken to modify the procedures for recruiting, classifying, and compensating scientific personnel in order to reduce the present handicap of governmental scientific bureaus in competing with industry and the universities for top-grade scientific talent. To provide coordination of the common scientific activities of these governmental agencies as to policies and budgets, a permanent Science Advisory Board should be created to advise the executive and legislative branches of Government on these matters.

The most important ways in which the Government can promote industrial research are to increase the flow of new scientific knowledge through support of basic research, and to aid in the development of scientific talent. In addition, the Government should provide suitable incentives to industry to conduct research, (*a*) by clarification of present uncertainties in the Internal Revenue Code in regard to the deductibility of research and development expenditures as current charges against net income, and (*b*) by strengthening the patent system so as to eliminate uncertainties which now bear heavily on small industries and so as to prevent abuses which reflect discredit upon a basically sound system. In addition, ways should be found to cause the benefits of basic research to reach industries which do not now utilize new scientific knowledge.

Renew Scientific Talent

The responsibility for the creation of new scientific knowledge—and for most of its application—rests on that small body of men and women who understand the fundamental laws of nature and are skilled in the techniques of scientific research. We shall have rapid or slow advance on any scientific frontier depending on the number of highly qualified and trained scientists exploring it.

The deficit of science and technology students who, but for the war, would have received bachelor's degrees is about 150,000. It is estimated that the deficit of those obtaining advanced degrees in these fields will amount in 1955 to about 17,000—for it takes at least 6 years from college entry to achieve a doctor's degree or its equivalent in science or engineering. The real ceiling on our productivity of new scientific knowledge and its application in the war against disease, and the development of new products and new industries, is the number of trained scientists available.

The training of a scientist is a long and expensive process. Studies clearly show that there are talented individuals in every part of the population, but with few exceptions, those without the means of buying higher education go without it. If ability, and not the circumstance of family fortune, determines who shall receive higher education in science, then we shall be assured of constantly improving quality at every level of scientific activity. The Government should provide a reasonable number of undergraduate scholarships and graduate fellowships in order to develop scientific talent in American youth. The plans should be designed to attract into science only that proportion of youthful talent appropriate to the needs of science in relation to the other needs of the nation for high abilities.

Include Those in Uniform

The most immediate prospect of making up the deficit in scientific personnel is to develop the scientific talent in the generation now in uniform. Even if we should start now to train the current crop of high-school graduates none would complete graduate studies before 1951. The Armed Services should comb their records for men who, prior to or during the war, have given evidence of talent for science, and make prompt arrangements,

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consistent with current discharge plans, for ordering those who remain in uniform, as soon as militarily possible, to duty at institutions here and overseas where they can continue their scientific education. Moreover, the Services should see that those who study overseas have the benefit of the latest scientific information resulting from research during the war.

Lid Must Be Lifted

While most of the war research has involved the application of existing scientific knowledge to the problems of war, rather than basic research, there has been accumulated a vast amount of information relating to the application of science to particular problems. Much of this can be used by industry. It is also needed for teaching in the colleges and universities here and in the Armed Forces Institutes overseas. Some of this information must remain secret, but most of it should be made public as soon as there is ground for belief that the enemy will not be able to turn it against us in this war. To select that portion which should be made public, to coordinate its release, and definitely to encourage its publication, a Board composed of Army, Navy, and civilian scientific members should be promptly established.

Program for Action

The Government should accept new responsibilities for promoting the flow of new scientific knowledge and the development of scientific talent in our youth. These responsibilities are the proper concern of the Government, for they vitally affect our health, our jobs, and our national security. It is in keeping also with basic United States policy that the Government should foster the opening of new frontiers and this is the modern way to do it. For many years the Government has wisely supported research in the agricultural colleges and the benefits have been great. The time has come when such support should be extended to other fields.

The effective discharge of these new responsibilities will require the full attention of some over-all agency devoted to that purpose. There is not now in the permanent Governmental structure receiving its funds from Congress an agency adapted to supplementing the support of basic research in the colleges, universities, and research institutes, both in medicine and the natural sciences, adapted to supporting research on new weapons for both Services, or adapted to administering a program of science scholarships and fellowships.

Therefore I recommend that a new agency for these purposes be established. Such an agency should be composed of persons of broad interest and experience, having an understanding of the peculiarities of scientific research and scientific education. It should have stability of funds so that long-range programs may be undertaken. It should recognize that freedom of inquiry must be preserved and should leave internal control of policy, personnel, and the method and scope of research to the institutions in which it is carried on. It should be fully responsible to the President and through him to the Congress for its program.

Early action on these recommendations is imperative if this nation is to meet the challenge of science in the crucial years ahead. On the wisdom with which we bring science to bear in the war against disease, in the creation of new industries, and in the strengthening of our Armed Forces depends in large measure our future as a nation.

Science News Letter, July 28, 1945

ORDNANCE

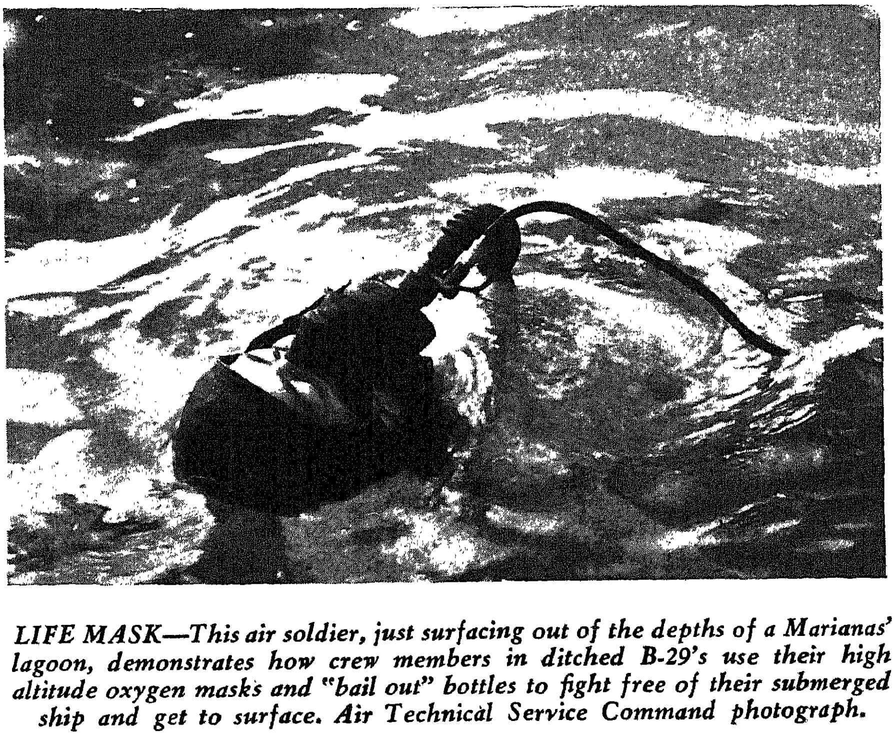
Kickless Cannon

Secret of the recoilless operation lies in construction of breech and of cartridge case. It is very accurate and so light that it can be carried by hand.

See Front Cover

➤ A ONE-MAN cannon, which fires without recoil, and enables the front-line infantryman to hurl regular artillery-type shells at enemy tanks and pillboxes with the accuracy of a sniper's rifle, is the newest weapon to be put into the hands of American fighters, the War Department has disclosed. It has already been combat-tested, with highly satisfactory results.

Secret of the recoilless operation lies in the construction of the breech, and of the cartridge case that fits into it. The breech, instead of being tightly closed to prevent the backward leakage of gases when the gun is fired, is purposely left partly open, with a series of tubes to guide the back-flash when it comes. The wall of the cartridge case is perforated, permitting part of the gases to flow outward and then back. The force of this purposely arranged back-flash is just suf-



LIFE MASK—This air soldier, just surfacing out of the depths of a Marianas' lagoon, demonstrates how crew members in ditched B-29's use their high altitude oxygen masks and "bail out" bottles to fight free of their submerged ship and get to surface. Air Technical Service Command photograph.

ficient to offset the gun's recoil, so that the gunner actually feels less "kick" on firing than he would from a .22 rifle.

As thus far disclosed, recoilless cannon are produced in two calibers. One, which may be fired bazooka-fashion over a single man's shoulder, has a caliber of 57 millimeters (2¼ inches) and throws a 2¾-pound projectile to a range of two miles, with muzzle velocity of 1,200 feet a second. The other, which can be set up on the ordinary .30-caliber machine-gun tripod, has a caliber of 75 millimeters (3 inches); it uses three types of projectiles varying in weight from 13 to 15 pounds. Its useful range runs up to four miles, with a 1,000-foot-per-second muzzle velocity.

Muzzle velocities are low and useful ranges are relatively short, in both these weapons. However, it is not anticipated that they will be employed up to the limits of even the range they have; they are intended primarily for infighting at a few hundred yards, where the remaining velocities of their shells will be more than sufficient for their purposes.

By achieving completely recoilless operation, these weapons have made it possible to carry artillery fire-power and accuracy right up into the line with riflemen and machine-gunners. Hitherto, some measure of this has been made possible through the use of mortars and rocket weapons; but both of these suffer from the dual handicaps of relative inaccuracy as compared with rifled weapons, and very low velocity with consequent poor penetration when used against armor.

The new recoilless cannon are so accurate that it has been considered worth while to equip them with telescopic sights. Their gunners can pick their targets, such as the gun ports of concrete pillboxes or the turrets of tanks, with complete confidence of hitting them.

The guns are very light, largely because it has been possible to dispense with the recoil-absorbing springs and hydropneumatic cylinders that add so much weight to conventional-type artillery pieces. The 57-millimeter weapon (tube alone) weighs only about 40 pounds, so that one man can carry it on his shoulder. The 75-millimeter gun weighs 105 pounds; it can be carried over rough ground for at least short distances by from two to four men.

Every advantage, here as elsewhere, has its price. The purposely-arranged back-flash that offsets the recoil creates an area immediately to the rear of the breech where it is exceedingly unsafe to be when the gun is fired. Gun crews, as in the case of the bazooka and other rocket-firing weapons that also spit backwards when they go off, must be trained to work from alongside instead of from the rear as ordinary artillerymen do. Aside from this point to be remembered, there's nothing the matter with the new recoilless guns.

Science News Letter, July 28, 1945

PUBLIC HEALTH

Children Live Longer

Actual decrease in infant mortality is reported from Russia. Achievement is attributed to special pre-natal care and provisions for premature babies.

By N. EGOROV
Soviet Scientists Antifascist Committee

➤ CHILDREN of the USSR escaped during World War II the terrible consequences to life and health entailed by World War I. Owing to the endeavors of the government authorities, child mortality has actually decreased since the war broke out, and the figure now is less than two-thirds of what it was in 1940. The credit goes largely to the extensive work done in the prophylactic field, and it may here be said that prevention rather than cure is the keynote of the whole Soviet public health system.

In the care of mother and child, this feature is particularly pronounced. The fight against child mortality begins in the pre-natal stage. The health of the expectant mother and her child is the constant care of special welfare centers. Here all expectant mothers secure advice and, if necessary, treatment free of charge; throughout the period of pregnancy they are under medical observation, and if any deviation from the normal is noted, the woman is placed in a special clinic.

The mothers-to-be are also instructed at these centers in pregnancy hygiene, infant care and feeding and the symptoms of the principal baby ailments—an invaluable aid to the mother, particularly if the child is her first, in making herself and the home ready to receive the little newcomer to the family. To help the expectant mother with the various problems that arise, a midwife visits her at home, sees how she lives, and dispenses advice accordingly. For the confinement itself, there are in all the towns and district centers, special maternity homes or lying-in departments of the general hospitals.

In recent years, particular interest has developed in babies born prematurely. The records of the large obstetric clinics and the leading maternity homes reveal that a high percentage of survivals can be achieved. In the past few years hospital divisions for prematurely born babies have been opened in many of the Soviet towns and here the child spends, together with its mother, the first six or eight weeks of its life. The baby in this time progresses considerably towards normality, while the mother learns the special care it needs.

Nurses and doctors from the child welfare centers visit the homes of the babies under their supervision to see that they receive proper care and can develop normally. If the mother is ill and cannot nurse the child herself, or if her supply of milk is insufficient, the welfare center again comes to the rescue, for it has a donor station at which mothers with abundant milk can leave their surplus.

Then there are the nurseries and children's homes, where children are brought up under the supervision of competent medical and training personnel. The nurseries are for youngsters whose mothers work, while the children's homes take in children who have lost their parents or whose mothers are ill or alone. Between the ages of three and seven, children whose mothers go to work attend kindergartens. At seven the child goes to school, and here too it is under constant medical observation. The school doctors take measures for the prevention of contagious disease among the children in their charge, and physical training is also conducted under their supervision.

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Up to the time the yolk sac is absorbed and feeding begins fish are known as *fry*.

A new *liquid insecticide*, claimed to be effective in destroying chewing insects, is a sodium-antimony-lacto-phenate and will be known as SALP; although poisonous and toxic, it is relatively safe and economical.

INVENTION

Patent List Stirs Interest

Inventors may offer their devices for sale or licensing in simple, informal letter. Big as well as small businesses among those inquiring.

➤ THE U. S. Patent Office's newest service to the public, a register of patents available for licensing or sale, is arousing the interest of big industry as well as small business, where the liveliest response was expected from the first. In the correspondence received during the first month's existence of the Register have been letters and personal inquiries from representatives of some of the largest manufacturing concerns in the country. They are concerned not only with finding patents suitable for their use, but also with offering patents of their own for licensing to other producers.

Thus far, some 300 patents, held by about 200 inventors, have been offered for listing in the Register. Condensed, plain-English descriptions of a considerable number have already appeared in print. Those still unpublished are available for inspection at the Patent Office here.

Official red tape and long-winded legal jargon have been swept into the discard together, in the preparation of the new Register. The owner of the patent merely writes a letter, enclosing a copy of his patent or giving its number and enclosing ten cents to pay for a copy. He also makes the statement that he is willing to sell or license his rights in the patent on reasonable terms. The Patent Office then publishes a terse, one- or two-sentence description in the Register, giving the owner's address. Further negotiations are conducted directly between owner and prospective licensee or purchaser.

A mailing list is maintained, on which interested manufacturers may have their names entered on request. They will have marked copies of the Register mailed to them, calling attention to available patents in the particular class or category with which they are most concerned. A similar service is maintained for trade journals, which publish the descriptions for the benefit of their clients.

A few highlights from among the patents thus far listed:

Telephone lock, to prevent unauthorized use of telephone instruments for outgoing calls.

Compartmented cigarette package, from which empty cells are removed as cigarettes are used. Pack diminishes in size, but remaining cigarettes are protected against squashing.

Dictating machine vacuum cleaner, which sucks away wax dust from cylinders and deposits it in a suitable receptacle.

Mottled paint, consisting of drops of varicolored enamel immersed in liquid with which they will not mix. Spread by brush, they give mottled or streaked effect.

Electric light that, when dropped into water, turns itself over, floats to surface, and lights up.

Fireplace ashpan, with hinged cover to prevent contents from spilling during removal, adjustable to any size fireplace.

Measuring device consisting of small wheel to be rolled over line to be measured; can be set to click for any desired number of inches or feet.

Pilot light for electric iron, which indicates whether current is on or off.

Folding chair with detachable legs and back, which can be boxed in compact cylindrical container.

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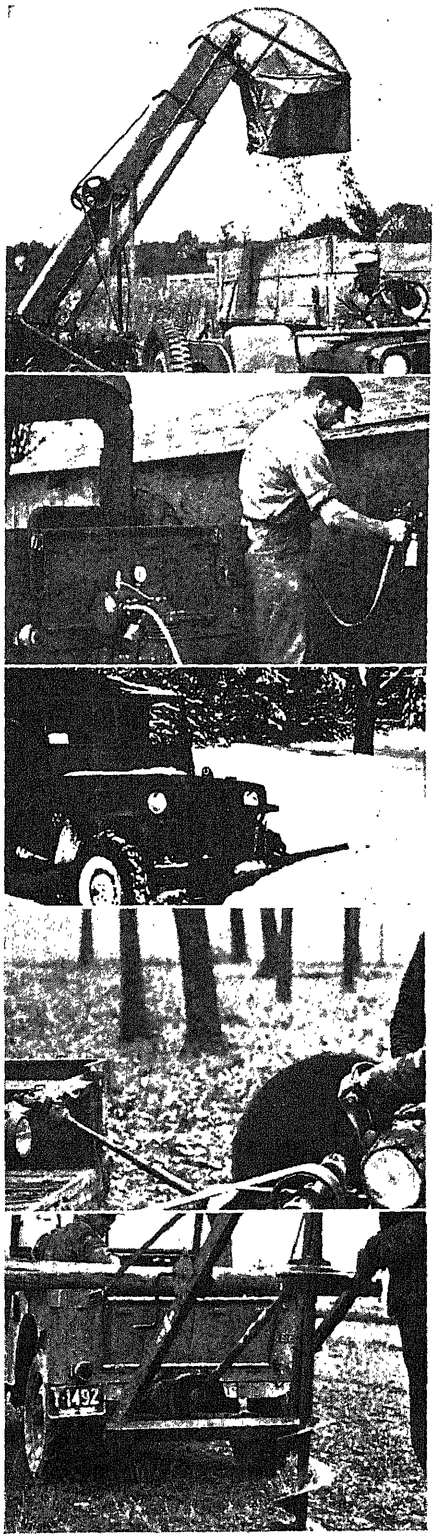
ENGINEERING

Jeep Redesigned For Peacetime Farm Jobs

➤ THE JEEP, which has gone through the war as the Army's dependable mechanical burro, is now being groomed for postwar jobs down on the farm. The civilian version of this handy little quarter-ton truck-of-all-work was put through its paces near Toledo, Ohio, before a group of newspaper and newsreel men, on the 2,000-acre experimental farm of Willys-Overland Motors, Inc.

Outstanding change in the jeep's design is a power takeoff just above the towing hitch at the rear. This makes it possible to use part or all of the engine's power for such jobs as sawing wood, digging post-holes, pumping water, running cornshellers, etc. In effect, it converts the jeep into a highly mobile power plant that

(Turn to page 63)



FUTURE JEEP—The postwar jeep will find many uses on the farm, such as the ones pictured in this Willys-Overland Motors photograph. From top to bottom: with a field cutter operating on rye; painting barns; clearing snow; buzzing wood; digging post holes.

AERONAUTICS

Targets for Bombers Pin-Pointed by Lead Plane

➤ TARGETS for formations of conventional bombers were pin-pointed through fog, darkness and bad weather during past months by a new Lockheed P-38 Lightning Pathfinder with special equipment, it is now revealed. The exact equipment carried by this modified Lockheed fighter is still not releasable, but its effectiveness in locating invisible enemy targets is no longer a secret.

The Lightning Pathfinder has an elongated metal and plastic pilot's nacelle that is cylindrical and blunt. Its instruments are advanced over those of the "droop-snoot" Lightning which contained all the standard bombing and navigational equipment of a heavy bomber. Like its predecessor, the Pathfinder is a two-man plane, a pilot and a bombing operator carried in its specially-constructed nose.

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NUTRITION

Favorite Drinks of the Ancients Include Lemonade

➤ SIPPING your frosted beverage on a hot day, it might refresh you to know of others, centuries ago, who enjoyed these same thirst quenchers.

Lemonade was the favorite beverage of the Mongol emperors in China, a special official of high rank being charged with keeping enough on hand. The emperor even gave Mars Sergius, the Lord High Lemonade Mixer or whatever his thirteenth-century title was, a gold-tablet diploma because of his talent for preparing cool drinks known as sherbets, particularly lemonade.

"Cold chocolate and lots of it," the Aztec emperor Montezuma probably demanded each summer in the Mexican palace which he enjoyed before America was discovered. Cortez found chocolate the national drink of Mexico—rich and poor alike enjoyed it.

Montezuma, who drank fifty pitchers of chocolate a day, preferred his with a thick froth, delicately flavored with vanilla and spices, and sweetened with sugar or honey.

No one knows when Chinamen started drinking tea, but the scholarly emperor Chen Nung praised the drink more than 4,500 years ago.

"Tea is better than wine," Chen Nung is reported to have said, "for it leadeth not to intoxication, neither does it cause a man to say foolish things and repent thereof in his sober moments."

England began its Age of Tea not long before the Boston Tea Party, a century or so earlier a two-pound package of tea being considered a worthy present for the King.

Coffee was first enjoyed in Ethiopia, but the natives tried to keep their coffee-bean drink to themselves. Arabians borrowed coffee from the Abyssinians about the twelfth century A. D., and several centuries later England had its famous coffee houses and "speakeasies" where coffee was black marketed.

To make iced coffee to take the sizzle out of summer, place in the coffee-maker your usual supply of coffee, but use only half as much water. Poured hot over ice, the double strength of the coffee makes up for the melting ice. Serve with sugar and cream.

The Greeks became acquainted with bananas, according to historians, when Alexander the Great returned from an East Indian expedition. Oranges, which you may enjoy in orangeade, spread from their Oriental home through Europe during the Mohammedan conquests. American Indians get credit for giving maple sugar to the world.

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STATISTICS

One Line Admiral in Seven Is Under 50 Years

➤ TODAY one line Admiral in every seven is under 50 years of age; five years ago none were under 50. The average age of Admirals in our Navy's line of command was lowered by 2.2 years between May 1, 1940, just before the vast expansion program was launched, and May 1, 1945, according to statisticians of the Metropolitan Life Insurance Company.

The present average age of Admirals who would take command is 56.4 years whereas five years ago it was 58.6 years. During the last war it was slightly higher, being 58.7 years. This reduction has occurred despite the recall to active duty of a large number of retired officers, who comprise almost one-fifth of the total number of Admirals on active duty.

The average age of the three Fleet Admirals is 65 years; for Admirals, it is 63.6 years; for Vice Admirals, 59.6 years; and for Rear Admirals, 55 years. Rear Admirals range in age from 42 to 75 years, the difference in ages being greatest for this group.

Science News Letter, July 28, 1945

IN SCIEN

CHEMISTRY

Light Intensity Affects Vitamin C in Tomatoes

➤ THE AMOUNT of ascorbic acid, or vitamin C, in tomatoes—the most important vitamin of this fruit—varies directly with the light intensity in the growing areas, studies in the U. S. Plant, Soil and Nutrition Laboratory at Cornell University indicate.

Of this discovery, Dr. L. A. Maynard, director of the laboratory and head of Cornell's School of Nutrition, said, "investigators believe that it will be worth while to chart areas where commercial production will yield the highest vitamin content in this important food."

In the tomato research, studies by Dr. W. L. Nelson showed first of all that tomatoes as marketed vary widely in their content of ascorbic acid. Dr. Karl C. Hamner and Dr. G. F. Somers then found that most variations resulted from differences in light intensity prior to harvest.

For three years, the scientists at Cornell have shifted tomatoes around, indoors to outdoors, from sun to shade and back. They also studied vitamin content as grown commercially in different areas. In a recently completed study, the tomatoes grown in one area had one-third more ascorbic acid than the same variety grown in another nearby area. A light-measuring device showed that those grown in the first section were subject to one-third greater light intensity.

Science News Letter, July 28, 1945

ASTRONOMY

Calcium-Gas Envelope Surrounds Sun-Like Star

➤ THE YELLOW, solar-type member of the two-star team, RZ Eridani, in the constellation of the river Eridanus, is surrounded by an envelope of calcium gas, Carlos U. Cesco and Jorge Sahade of the Yerkes and McDonald Observatories of the Universities of Chicago and Texas report in the *Astrophysical Journal.* The light of the variable star drops noticeably about once in 39 days when the subgiant, calcium-encased star comes between its brighter calcium companion and the earth.

Science News Letter, July 28, 1945

NUTRITION

Vitamin A Consumption Should Be Increased

➤ INCREASING the family's vitamin A consumption is good for young and old, it appears from studies of rats reported by Dr. H. C. Sherman and Dr. H. L. Campbell, of Columbia University, to the National Academy of Sciences.

Liberal intakes of this vitamin, found in such foods as butter, liver, egg yolk, carrots and green leafy vegetables, tends to postpone aging and increase length of life, Dr. Sherman and colleagues have previously reported.

Now they find that the offspring in rat families on the liberal vitamin A intake grow somewhat more rapidly and with less individual variability. This indicates, the scientists point out, that liberal vitamin A has both a favorable and a stabilizing influence on growth.

This favorable, stabilizing effect on rat growth was observed with vitamin A intakes two and four times higher than the intake considered fully enough to meet the rat's nutritional needs.

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ENGINEERING

Desert Air Coolers For Use in Middle East

➤ HOME air-cooling systems of the evaporating type, now used extensively in Oklahoma, Kansas, Nebraska and other states of the Southwest in semi-arid America, so interested the Prince Regent and heir apparent to the throne of Iraq in a recent visit to the United States that he probably will recommend their wide use in his country and other areas of the Middle East.

Since the climate in biblical lands and neighboring countries is much like that in these American states, coolers operating on the evaporation principle should prove successful.

In them, warm dry air is pulled by an electric fan through a moist blanket of excelsior, hay, burlap or other porous material. The wetted material and the fan are placed in a simple homemade box which is fitted into the lower sash of one window. This furnishes direct relief from heat to a single room, or, by a system of wall ducts, will distribute cool air throughout the entire house.

The seasoned outdoors enthusiast has found the same principle effective in constructing a kind of desert cooler for foods when camping.

A frame of the size desired is covered with burlap or other porous cloth, which is kept wet, allowing evaporation to take place. The wind replaces the electric fan. The air inside the burlap enclosure is cooled enough so that perishables, even meat, can be stored safely for a number of days. In the days before electrification, western farmers found the system indispensable.

The principle is used successfully by the Army in arid countries for outdoor water-cooling purposes. It has developed a porous water bag through the walls of which water percolates very slowly and evaporates.

This cooling method is not new. It originated hundreds of years ago in warm countries when potters found that water in their crude earthen storage jugs was cooled by seepage through the porous material and subsequent evaporation.

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CHEMISTRY

Natural Gas Is Used In Making Calcium Carbide

➤ A NEW method for making calcium carbide, in which crushed limestone is combined with natural gas instead of with crushed coke as in present practice, is offered by two chemists of Dallas, Texas, Dr. A. J. Abrams and Dr. L. B. Cook, for patent 2,380,008. Calcium carbide is one of the most important of present-day industrial materials, being the most convenient source of acetylene used in welding torches, portable lamps, etc.

In the new method, crushed limestone is heated in an electrical induction furnace to a temperature of about 1000 degrees Centigrade, while natural gas containing a high percentage of methane is flowed through it. A second heating at a higher temperature, in the neighborhood of 1700 degrees Centigrade, completes the conversion into calcium carbide.

The new method, the inventors point out, permits the manufacture of calcium carbide in regions where coke is not cheaply available, and also provides a good economic use for methane, which has long been a chemical waif among the more easily utilizable, larger hydrocarbon molecules that make up the mixture known as natural gas.

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AERONAUTICS

Conveyor Belt in Planes Hastens Dropping Packages

➤ CONVEYOR belt systems in Army cargo airplanes, for unloading packages to be dropped by parachutes to ground troops, it is now revealed, decrease the time required for discharging the cargo from 40 minutes to a few seconds, and promotes safety to plane and crew by greatly lessening the time the plane was formerly required to remain exposed to enemy gunfire.

These belts, similar to the carrier belts used in industries, are endless chain-driven conveyors operated by electric motors of less than four horsepower. Power is derived from the plane's 24-volt system. The belts extend from behind the pilot's compartment to the rear door of the plane, and run at about six feet per second. They terminate at roller-bearing platforms mounted at the cargo doors, which launch the containers from the airplanes.

Each package has a closed parachute attached to it. When the package drops, a static line attached to it automatically opens the chute.

The rapidity with which packages are shot out of the plane, one closely following another, means that they land relatively near each other, making their recovery on the ground much quicker and easier.

Another important advantage of the belt system is safety to crew members, particularly to the doormen who are required to throw the packages out in planes not equipped with the conveyor belt system. A sudden lurch of a plane may throw them out along with the package.

Present installations of the conveyor belt system are in Douglas C-47 cargo-carrying aircraft.

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CHEMISTRY

Simple Method Prepares Transparent Plastic

➤ EDWIN H. Land, head of the Polaroid Corporation, together with Robert P. Blake, both of Cambridge, Mass., have received patent 2,380,363 on a method for preparing light-polarizing sheets of transparent plastic by simply rubbing their surfaces with brushes, rotating disks, rapidly moving bands or other friction-creating means, thereby lining up their surface molecules so that their long axes will be parallel.

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ASTRONOMY

Scorpius Shines in South

Jupiter is also visible early on August evenings, and after midnight, Mars, Venus and Saturn appear. Many meteors can be seen this time of year.

By JAMES STOKLEY

➤ THAT CHARACTERISTIC constellation of summer—Scorpius, the scorpion—now appears in full view low in the southern evening sky. Brightest star in the group is red Antares; extending from it to the left is a curved row of stars that represents the scorpion's tail, so this is one constellation that does bear some resemblance to the thing after which it is named. In the next constellation to the left, which is Sagittarius, the archer, not much resemblance to that figure can be found. This group looks more like a teapot, with the spout of the teapot just over the end of the scorpion's tail, ready to dump its hot tea upon the arachnid!

Also in Sagittarius is one of the three dippers in the sky, and the least known of the set. The four stars that form the teapot's handle are the bowl of this dipper, while the handle extends upwards and to the right. It is called the "milk dipper," possibly from its proximity to the Milky Way of which the brightest part is in this direction.

The other dippers are in the north, as usual. Most people know the big dipper, part of Ursa Major, the great bear. It is now to the northwest, with the handle curving westward and pointing to the star Arcturus. The two lowermost stars in the big dipper are the pointers, whose direction indicates the pole star, Polaris.

In addition to standing almost directly over the north pole of the earth, and so always marking the north (always, at least, in our century, though not after a few thousand years) Polaris is at the end of the handle of the little dipper. This, in turn, is part of Ursa Minor, the lesser bear. Both bears are quite extraordinary in the way they were represented on the old star maps, since in each case the handle of the dipper was taken as the bear's tail, quite ignoring the fact that bears have only very short tails!

Stars Visible

Antares is a star of the first magnitude, and so is Arcturus. In addition, three other stars of this classification are visible these August evenings. Brightest is Vega, in Lyra, the lyre, directly overhead at the times for which the accompanying maps are drawn— i. e., 11:00 p. m., your own kind of war time on Aug. 1, and 10:00 p. m. on Aug. 15. Southeast of Vega is Altair, part of Aquila, the eagle. High in the northeast is Deneb, in Cygnus, the swan.

In the early evening in August, setting around 10:15 on the first, is the planet Jupiter. It stands in the constellation of Virgo, the virgin, of which only part is visible on the map in the west. Jupiter's magnitude is minus 1.3, which exceeds that of any of the first magnitude stars mentioned.

Beginning after midnight, three other planets appear. Mars comes up about 1:30 a. m., in the constellation of Taurus, the bull, and just north of the bright star Aldebaran. Venus, the brightest of all (magnitude minus 3.5) is in Gemini, the twins, and comes up about an hour and a half later. Saturn, also in Gemini, comes up a little later.

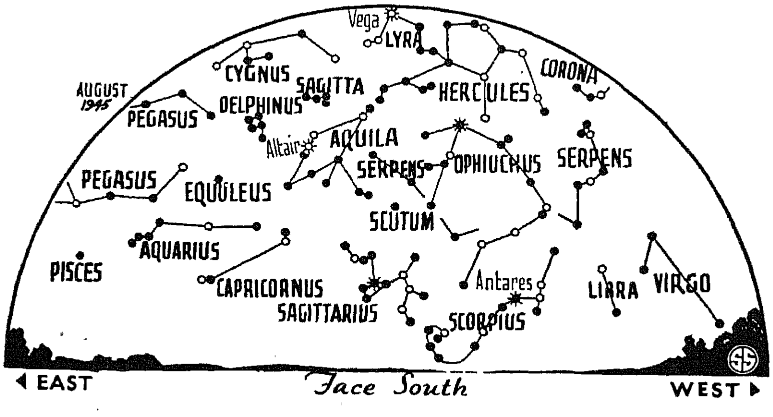
Every August the earth, in its revolution around the sun, passes through the swarm of meteoric material that forms the so-called Perseid shower. So every year, about this time, we see in the night-time sky a considerably larger number of meteors than we do normally. These meteors all seem to radiate from the constellation of Perseus, the champion, hence their name. Actually, the paths of the meteors are parallel and they seem to converge in the distance as the parallel tracks of a railroad seem to run together.

Though these meteors are seen every year, the moon may sometimes interfere. If the night of Aug. 11, during which the shower is at its maximum, happens to be that of full moon the sky is so brilliant that the meteors are scarcely visible. But this year the moon is new on the seventh. During the night of the 11th it sets quite early, making the rest of the night dark.

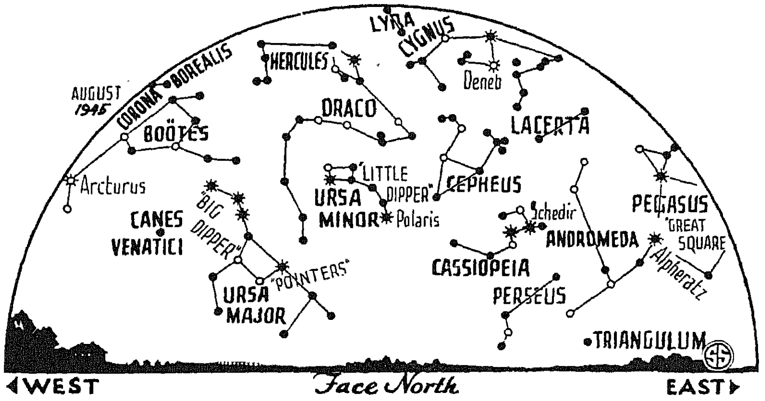
Meteor observing is a sport that requires late hours. Because of the way the earth turns in relation to its movement around the sun, those meteors we see before midnight have to catch up to us, but after midnight we meet them head-on, and they are more numerous. In the same way, as you walk along the street, you are more likely to pass more people going the other way than people going the same direction as yourself.

The stray meteors that are hitting the earth all the time are probably merely some of the debris that was left over when the solar system was formed, but the meteors of the regular showers seem to be the remains of comets. The Perseids seem to be associated with Tuttle's comet, last seen in 1862. Other comets are the parents of other showers. Temple's comet, for example, seen in 1866, is responsible for the famous Leonid shower which appears in November.

From the amount of light a meteor gives as it flashes through the air, it is possible to calculate its size, and this turns out to be very small, most meteors being of the order of size of the head of a pin. As this pinhead particle enters the earth's atmosphere at high speed, friction with



✲ ✱ ○ • SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS



the air heats it and it vanishes in the flash of light that we see. Occasionally a larger mass comes in, big enough to survive the passage through the atmosphere so it can land on earth. This is called a meteorite. Apparently the meteors of the showers are all small, for there is no authenticated case of a meteorite being identified with one of the showers.

Professional astronomers always appreciate amateur help in observing meteors. Dr. Charles P. Olivier, director of the University of Pennsylvania's Flower Observatory, at Upper Darby, Pa., is an authority in this field and welcomes reports from laymen. The simplest report is to count the number of meteors that you see in half-hourly periods, say from midnight to 12:30, 12:30 to 1:00, 1:00 to 1:30 and so on. If you know the constellations, you can mark the paths of the meteors, particularly the bright ones, on a map.

Celestial Time Table for August

Aug.	EWT	
2	7:07 p.m.	Moon passes Mars
4	11:46 a.m.	Moon passes Venus
5	7:22 p.m.	Moon passes Saturn
7	8:32 p.m.	New moon
11	1:38 a.m.	Moon passes Jupiter
12	Early morning	Perseid meteors
14	2:00 a.m.	Moon farthest, 251,400 miles
15	8:36 p.m.	Moon in first quarter
21	Midnight	Venus passes Saturn
23	8:03 a.m.	Moon nearest, 226,500 miles
29	11:44 p.m.	Moon in last quarter
31	9:07 a.m.	Moon passes Mars

Subtract one hour for CWT, two hours for MWT, and three for PWT.

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AERONAUTICS

Air Congestion Expected

Anticipating greatly increased traffic over LaGuardia Field after the war's end, officials are now planning improved facilities for radio direction.

➤ EXTENSIVE planning is now under way by officials concerned with LaGuardia Field on Long Island, New York City's great airport, for controlling sky traffic because of the enormously increased use of the field expected in post-war days. This means particularly radio communication with approaching planes, instructing them relative to weather conditions, what air levels to use, and when and where to land.

LaGuardia field is now one of the largest and busiest traffic control centers in the world, according to the U. S. Civil Aeronautics Administration. But, it says, a tremendous increase in business after the war may be expected, and preparations for it must be made now.

"New York's problem is complicated," the Administration states. "Here, at LaGuardia Field, is a mixture of foreign traffic entering the streams of domestic traffic coming from every part of the continent centering at the country's greatest metropolis. New York is now, and will be increasingly, the terminus for inter-continental traffic."

Controlling sky traffic becomes increasingly important in bad flying weather. When instruments were developed to enable pilots to fly through storms and cloudy weather conditions, traffic control along the airways became necessary. Now, with many planes in the air in all kinds of weather, and scores converging on a spot like New York and other great American fields, the pilot must be helped to the ground.

The pilot must be given information by radio relative to weather conditions and landing conditions, and must be instructed at which thousand-foot level to approach, when to drop a thousand feet to a lower level, and when and on which strip to land. Three kinds of government workers perform these services, air traffic controllers, meteorologists and aircraft communicators.

These men rarely see the planes whose progress they chart and direct along the airways of the world. They sit before inclined posting boards with movable cards on which are recorded radio reports of planes received from pilots when miles away. As the planes approach the cards are moved downward on the board, and off the board when the plane lands.

New York's station handles both overseas-foreign and interstate-domestic communications, distinguishing it from others of the 400 stations operated by the Civil Aeronautics Administration. The big gun of the station is the intercontinental transmitter WSY at Sayville on Long Island. All overseas communication is handled by the Administration.

Science News Letter, July 28, 1945

Checking pH With L&N Indicator

Solid construction for long, trouble-free service is the characteristic of this Indicator's quality. Has rugged electrode suitable for many "soft" solids; plenty of amplification for fast, easy-to-make readings, complete shielding for full accuracy in hot, humid places; rigid mountings for complete protection of vacuum tubes and glassware; separate compartment for battery isolation. Ideal for lab or plant.

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Jrl. Ad. E-96(22)

Do You Know?

Some farmers in early days disinfected *grain seed* by soaking in sea water.

When spinning time comes the *silkworm,* working continuously for three days, produces a cocoon with the reelable thread from 800 to 1200 yards long.

A machine called a *penetrometer* is used to measure the toughness of meat; it is a cutting tool and records the pressure required to shear through a sample of the meat.

A policy of the U. S. National Park Service is not to disturb the *wild animal life* in any park until a scientific appraisal has been made of the probable effects of such action.

Solid *carbon dioxide* (dry ice) is so much denser than gaseous carbon dioxide that it can be used to extinguish fires outdoors in high winds, even gasoline-fed fires in wrecked airplanes.

Common tent *caterpillars,* particularly active on orchard trees in spring and early summer, hatch from egg-masses on twigs; the worms from a single egg-cluster hold together in building a tent in a crotch in the tree.

Fluorescent lamps, coming more widely into use in home lighting every day, do not require special wiring but are installed on the regular house-lighting current.

Extremely small amounts of deadly *carbon monoxide gas* in air are detected by a new solution containing palladium chloride, phospho-molybdic acid, and acetone; a measured quantity of the air is passed through the solution.

Anyone Can Use A Slide Rule

No Math Background needed if You Have the *Practical Slide Rule Manual* by J. M. Klock, Mathematician for the U. S. Navy.

An absolutely non-technical explanation of how to really use a slide rule for the fundamental math calculations. Indispensable for the man in the shop, and the student of all math and sciences. Special applications made to formulas from mathematics, engineering, aeronautics, air navigation, projectiles. Includes office applications to per cent, interest rates, and cost accounting. Large illustrations. Simple explanations. Get this booklet today and learn to use a slide rule.

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NUTRITION

Vitamins Aid Manpower

A gain of 4.1% was achieved in one year at an aircraft corporation. Absenteeism and turnover were reduced and work performance improved.

➤ A GAIN in manpower of 4.1% by conservative estimate was achieved in one year at the Lockheed Aircraft Corporation through a vitamin supplement given a group of its workers, Dr. Henry Borsook, of California Institute of Technology, reported.

The gain was made up of 6.6 working days per man per year through improved work performance; 2.3 days from a reduction in absenteeism; and 1.6 days from reduced turnover.

Improvement in industrial morale is considered the major factor responsible for the effect of the vitamin supplement, according to Dr. Borsook's report in the *Milbank Memorial Fund Quarterly.* The Milbank Fund is one of 12 organizations, including government agencies and industrial concerns, which supported the extensive study.

The vitamin supplement consisted in vitamins A and D from fish liver oil, three synthetic B vitamins (B_1, B_2, and niacinamid) and synthetic vitamin C. Besides this the supplement contained calcium. These were given twice a day, five days a week, for one year. A group of dispensers saw to it that every worker in the study got and swallowed his vitamin pills.

The workers in the project were a highly selected group of young men, exceptionally interested in their work. Examination before the vitamin supplement was started showed no signs of acute or severe diet deficiency disease. No dramatic results were therefore to be expected from the extra vitamins and calcium. Diet histories showed that they were eating about the same foods at the end of the study as at the beginning.

The men all volunteered for the study, and therefore were probably interested in improving their health, had initiative when there was a chance to do something about it, and were in a cooperative frame of mind.

These traits in a worker make for better industrial morale, Dr. Borsook points out. This is another reason why dramatic results from the vitamin supplement would not be expected. Improvement in work performance and reduction in absenteeism in such a group would therefore be more impressive, it is suggested, than in one made up of workers with lower morale and poorer health at the beginning of the study.

The vitamin-mineral supplement was given to one group while a similar group received pills and capsules identical in appearance but containing no vitamins. Records of work performance, absenteeism and turnover in a third group that did not take part in the study were also used for comparison.

The effects of the vitamin supplement did not show up until the second six months of the study. Then absenteeism from all causes was 19% less for the vitamin group than for the non-vitamin group. The greatest differences were in unauthorized absences, the least in illness absences.

Non-military terminations were 27% fewer in the vitamin group for the whole year. At the end of the year personnel ratings were significantly higher on the average for the vitamin workers than for the non-vitamin group.

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NUTRITION

Nuts Add Protein

➤ HOUSEWIVES whose families are tired of fish and cheese and beans when they want steak and chops may find nuts a help in solving the family meal problem. Nuts are a source of protein and high in food value. Their protein is not exactly the same as that of meat and other animal protein. They belong in the class with dried peas and beans and lentils, which make good meat substitutes when milk, eggs or cheese are served in the same meal. Nuts have the further advantage of pleasant flavor and their crunchiness adds a pleasant contrast to the soft consistency of meatless meals. They can well be taken out of the class of a between-meal snack and used as a meal-time food.

The Brooklyn Visiting Nurse Association, the Brooklyn Red Cross and health department which suggest greater meal-time use of nuts also suggest greater use of gelatin in meatless meals. The amount of protein furnished by gelatin dishes is very small, but in these days, every bit counts. Gelatin, moreover, like nuts, changes the character of familiar dishes, from soup to dessert. Fish molded in gelatin becomes a pleasing variety from plain boiled or fried fish. The same is true of diced vegetables and fruits.

Milk is another valuable item for use in meatless meals. It provides animal protein, of the same quality as that furnished by meat. It lacks the iron furnished by meat, but this can be supplied by mustard or similar greens. The combination of milk and greens in a meal gives the complete protein and iron of meat and in addition furnishes calcium and a more than adequate supply of vitamin A, which meat lacks. Molasses is another good source of iron and its sweetness will spare the sugar.

Drinking milk is only one way of consuming it. Milk can be used in cream soups and chowders, in custards and other desserts, and instead of water for cooking breakfast cereals.

On eggs as a meat substitute, the Brooklyn health authorities point out that two eggs will replace a medium serving of meat and in addition furnish vitamin A and extra amounts of vitamin G.

Science News Letter, July 28, 1945

HONORABLE SERVICE—This emblem is worn in the coat lapel of all honorably discharged veterans of the present war. It stands for "honorable service to our country."

Milk is cooled immediately after milking to lessen bacteria increase; bacteria multiply rapidly while milk is warm, but very slowly when it is at temperatures between 45 and 50 degrees Fahrenheit.

In the Activity of the Endocrine Glands

The depth to which protein permeates the fabric of metabolic life, and the role it plays as "raw-material" and component of elaborated secretions is indicated in hormonal composition.

Thyroxine, the active principle of the thyroid gland, is an iodinated phenylether derivative of the amino acid tyrosine. Epinephrine, the active principle of the adrenal medulla, is also a tyrosine derivative. Insulin, as elaborated by the islands of Langerhans, has been isolated in crystalline form and found to be a protein.

Only from the proteins of the foods eaten can the organism derive the protein substances required for these complex purposes.

Among man's protein foods meat ranks high, not only because of the percentage of protein contained, but principally because its protein is of highest biologic quality, applicable wherever protein is required.

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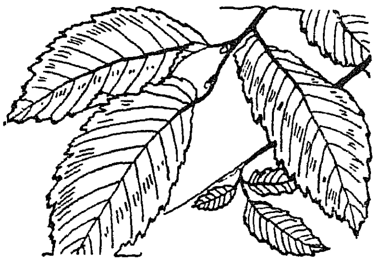
PLANT PATHOLOGY

NATURE RAMBLINGS

by Frank Thone



Precautionary Destruction

➤ ELM TREES have long been favorites with the people of this country. Elms are beautiful in themselves, especially the American or white elm, with its long, sweeping, arch-forming branches. We think, too, of the picture of George Washington accepting his commission as commander of the Continental forces under the great elm in Cambridge, Mass., and of other elms that have backgrounded memorable scenes in our history.

Yet in the face of this comes a recommendation from the Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, that farmers and other owners of mixed hardwood timber should concentrate their attention on the elms in them, especially if these trees show any signs of being sick, and cut them down and use the wood as quickly as possible. At first blush, it seems downright unpatriotic to make such a demand.

There is good practical reason, however, for this move. American elms are threatened by two serious scourges, the well-known though misnamed Dutch elm disease and a less-advertised though probably equally dangerous malady known only by its technical title, phloem necrosis. Either disease is almost inevitably fatal to an elm if it gets a firm hold on the tree: the only thing to do with a tree in which the infection has become established is to cut it down and burn it, to prevent it from spreading the disease to trees still unattacked.

Squads of disease-fighters have been doing this for several years in the areas where these diseases are most threatening. During the war this work has been seriously handicapped by the manpower shortage, so it has not been possible to extend the street and highway patrols out into the woods. Yet elms in the woods are just as likely to become diseased as those in the open, and much less likely to be detected while they are in the dangerously infective stage. It is for this reason that the prompt felling and utilization of any timber-lot elm that shows wilting or dead foliage is now recommended.

The recommendation even goes beyond the destruction of trees known to be diseased. It is suggested, in view of the present shortages of timber and firewood, that elms be cut before other trees. Elm has never been much esteemed as lumber, but it can yield posts and other rough timbers, where sawing or splitting is not required. Such elm logs as are cut for these purposes during the warm months should have their bark removed and burned, to kill off the disease-causing fungi and the bark beetles that serve as carriers for the infection.

Science News Letter, July 28, 1945

● Just Off the Press ●

CONTROLLERS FOR ELECTRIC MOTOR: A Treatise on the Modern Industrial Controller with Typical Applications to the Industries—Henry Duvall James and Louis Edwin Markle—*McGraw,* 324 p., illus., $5.

ELECTRICAL POWER USES IN MARINE SERVICE—John M. Dodds—*McGraw,* 444 p., illus., $3. Vol. 3, Marine Electricians' Library. A reference handbook.

THE GIST OF MATHEMATICS—Justin H. Moore and Julio A. Mira—*Prentice-Hall,* 726 p., illus., $5. Prentice-Hall mathematics series. 3rd printing.

DUTREX 20 AND 25, Plasticizers for Vinyl Chloride Resins—Shell Oil Company, 13 p., paper, illus., free. Report No. 1.

848 MEN—AND YOU—*Socony-Vacuum,* 46 p., paper, illus., free. The story of Socony-Vacuum research and product development.

HOW TO GET AND KEEP GOOD HEALTH—Stella Regina Dolan, ed.—*Ackerman,* 240 p., $2. 23 experts tell how to maintain health.

AN INTRODUCTION TO MEDICAL SCIENCE—William Boyd—*Lea,* 365 p., illus., $3.50. 3rd ed., thoroughly revised.

A MANUAL OF SURGICAL ANATOMY—Tom Jones and W. C. Shepard—*Saunders,* 195 p., illus., $5. Prepared under the auspices of the Committee on Surgery of the Division of Medical Sciences of the National Research Council.

PSYCHIATRY IN MODERN WARFARE—Edward A. Strecker and Kenneth E. Appel—*Macmillan,* 88 p., $1.50.

PSYCHOLOGY FOR THE ARMED SERVICES—Edwin G. Boring, ed.—*Infantry Journal,* 533 p., illus., $3. Prepared by a Committee of the National Research Council with the collaboration of many specialists.

SCIENCE, THE ENDLESS FRONTIER—Vannevar Bush—*Supt. of Doc.,* 183 p., paper, 30 cents. A report to the President on a program for postwar scientific research.

SCIENTIFIC SOCIETIES IN THE UNITED STATES—Ralph S. Bates—*Wiley,* 246 p., $3.50. A publication of the Technology Press, Mass. Inst. of Tech.

TECHNIQUES OF GUIDANCE: Tests, Records, and Counseling in a Guidance Program—Arthur E. Traxler—*Harper,* 394 p., illus., $3.50. Education for Living series.

Science News Letter, July 28, 1945

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☼ *FULCRUMED fork is any garden fork with a recently patented attachable leg fastened under the handle relatively near its lower portion. This is to help in lifting the load after the fork has been pushed into the ground.*

Science News Letter, July 28, 1945

☼ *ELECTRONIC color detective, that scientifically selects paint which absorbs the least amount of light and heat of the sun, plots an exact curve of the amount of light reflected by a paint sample, detecting particularly invisible red rays. A shade of battleship gray that absorbs the least red was thus selected to aid in keeping the ship cool.*

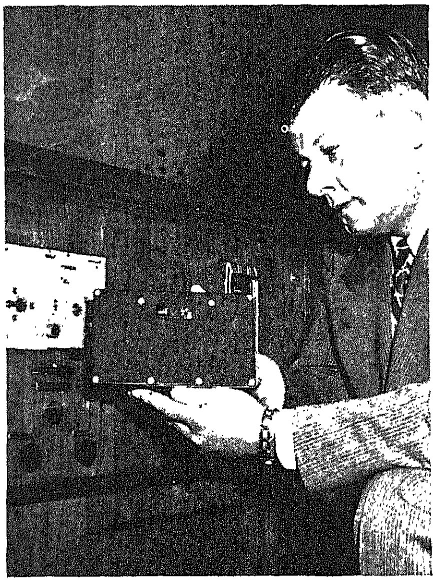
Science News Letter, July 28, 1945

☼ *BURIAL CASKETS made of plastics, sealed electrically, may soon be available under a recent patent. The plastic is the type that may be softened by heat. Electric heating elements, embedded in the body portion, form a tight joint with the cover when the house current is applied to them.*

Science News Letter, July 28, 1945

☼ *LIFE PRESERVER, improved type, is a vest-like garment that supports the wearer in the water in an upright position, but inclined slightly backward. The preserver, filled with a removable buoyant material, is reversible, fits snugly about the waist with a cord, and has a strap handle on the back to assist the rescuer.*

Science News Letter, July 28, 1945



☼ *WIRE RECORDER sets, attachable to home radio receivers, record music or words from the air or from the microphone by moving a long thin wire across the poles of a magnet. When the wire is re-run across the magnet, the record is reproduced by the loudspeaker.*

Science News Letter, July 28, 1945

☼ *COMBINATION SHOVEL, pick and axe, has a handle with one threaded end on which the shovel blade may be screwed, and pivoted joints on the sides for the pick and axe opposite each other. When not in use, pick and axe are turned lengthwise with the handle. A special catch holds either in working position when desired.*

Science News Letter, July 28, 1945

☼ *COMBINATION ice and roller skate has the ordinary foot plate mounted on single front and rear wheels. Around the rim of each wheel is a relatively narrower band of hard metal with sharpened outer edges for digging into the ice when the wheel is tilted sidewise in ice skating.*

Science News Letter, July 28, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 269.*

From Page 55

can carry 40 horsepower to any corner of the farm and then put it to work there.

The civilian jeep, like its Army prototype, can still "pull like a mule and climb like a goat," but its gear ratios and clutch area have been changed to fit its pace to the needs of farm life. It can operate as slow as three miles an hour in plowing, harrowing or seeding fields, it can speed up to 60 miles an hour as a passenger vehicle or a light pick-up truck, or it can run at an intermediate rate towing a trailer with a load of as much as 2½ tons.

Other changes include more comfortable seat cushions, larger headlights, redesigned steering gear, gear-shift lever on steering column, tail-gate on truck section.

Some of the dozens of farm tasks which the new jeep can perform are: mixing cement, plowing snow, filling silos, baling hay, spraying orchards, spray-painting or whitewashing buildings, stretching fence wire, spreading fertilizer.

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Question Box

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ASTRONOMY

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How old are admirals? p. 56.

PUBLIC HEALTH

How has child mortality been reduced in Russia? p. 54.

Where published sources are used they are cited.

BOOKS

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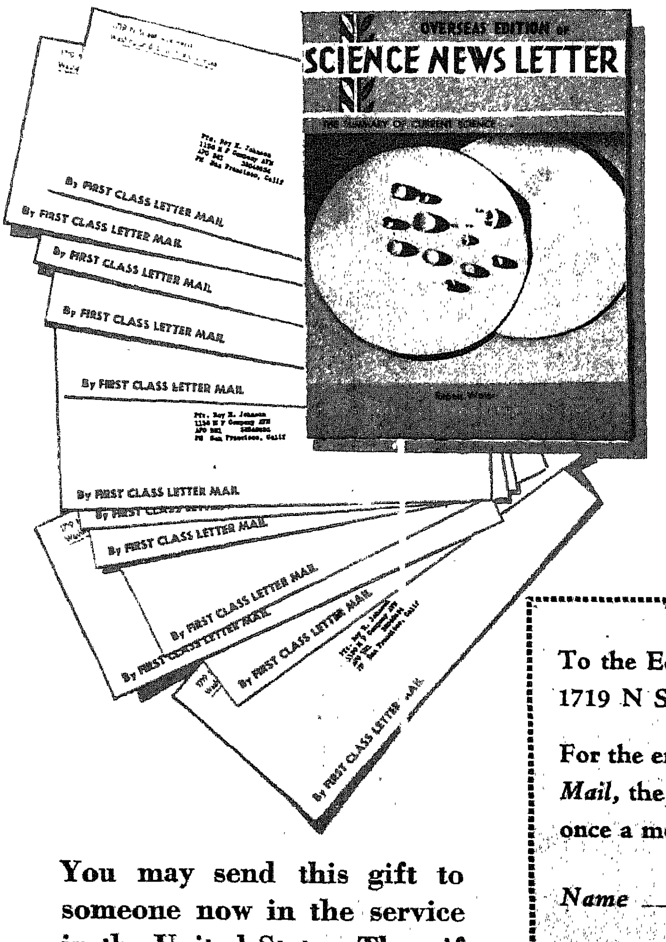
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CIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • AUGUST 4, 1945

Quinine Trail

See Page 67

A SCIENCE SERVICE PUBLICATION

PHARMACY

Medicine from Fagara Coco

Tree in Argentina yields drug that may be an effective substitute for quinidine in treating diseases of the heart rhythm.

➤ DISCOVERY of a possible substitute for a heart disease medicine now very scarce because of the war is announced by five Argentine scientists (*Science,* July 20). The scientists are Dr. Venancio Deulofeu, Dr. Rafael Labriola, Dr. Alberto Taquini, all of the University of Buenos Aires, and Dr. Oscar Orias and Dr. E. Moisset de Espanes of the University of Cordoba.

Fagarine is the name of the new drug, which from tests on animals and human patients seems likely to prove effective in heart disease characterized by auricular flutter and auricular fibrillation or other disturbances of the heart rhythm.

Quinidine has previously been used in such forms of heart disease. As its name suggests, quinidine is related to quinine and like quinine is obtained from the bark of the cinchona tree. Since the Jap invasion of Java, previously the source of most of the world's supply of quinine, quinidine has also been very scarce.

Fagarine comes from the leaves and young twigs of *Fagara coco,* a tree growing in central and northern Argentina. It was first isolated by another scientist, G. Stuckert. Chemical studies by Drs. Deulofeu, Labriola and associates indicate that it is composed of 19 carbon, 23 hydrogen, one nitrogen and four oxygen atoms. A probable structural formula for their arrangement in the fagarine molecule has been worked out.

Fagarine is more active in its effect on the heart than quinidine when given in the same doses, animal studies showed.

Six patients, two with auricular flutter and four with rheumatic heart disease and auricular fibrillation, have been given fagarine by Dr. Taquini, the heart specialist of the five-man research team. In all but one of these patients quinidine in the usual dose had failed.

Within 30 minutes after a single dose of fagarine, injected into the muscles, normal heart rhythm was restored in all six patients. In one patient the flutter started up again 28 days later as a result of an unusual effort made by the patient. Another dose of fagarine was again enough to restore the normal rhythm.

Science News Letter, August 4, 1945

PHYSIOLOGY

Test Before Transfusion

No girl should be given blood without Rh test, physicians are warned. Less than one cubic centimeter of Rh positive blood may be fatal to baby years later.

➤ NO BLOOD transfusion should be given to a young woman, a girl, or even a newborn girl baby unless tests for the Rh blood group are made first. This warning is given physicians in the *Journal of the American Medical Association* (July 28) by Dr. Philip Levine, of the Ortho Research Foundation, pioneer in Rh research.

In case the girl happens to have Rh negative blood, a transfusion of Rh positive blood may cause the death years later of her first-born baby, Dr. Levine has found.

What happens in case of the mingling of Rh positive blood with the incompatible Rh negative blood is a process like immunization against disease. A reaction is set up which serves to destroy the Rh positive blood just as the blood of an immunized person checks the invading germs of a disease.

The evidence is that unbelievably small amounts of blood will set up this immunization, Dr. Levine points out. The passage of much less than one cubic centimeter of Rh positive blood from the unborn baby to the Rh negative mother's bloodstream is enough to set up this immunization. If, after that, the woman should have an Rh positive baby, the baby would be killed or made very ill by its own mother's blood.

And the indications are that once a person is immunized, that person will remain immunized for the rest of his or her life. Although the Rh positive-killing antibodies in the blood may disappear in a relatively short time, the tissues responsible for the production of these antibodies remain capable of responding far more rapidly to any invasion of Rh positive blood. So that even though, after a time, blood tests may not show the presence of any immune antibodies in the blood, the immunization must be considered permanent.

Dr. Levine reported the case of a young woman, 20 years old, whose first baby was born with the most severe form of erythroblastosis fetalis, the disease caused by Rh incompatibility. This happened because she received seven transfusions of her father's blood when she was only six years old.

Before the fairly recent use of vitamin K as an anti-bleeding agent, it was a common practice to give newborn babies an injection of blood into their muscles, since it is rather difficult to transfuse blood into the small veins of infants. This process, like pregnancy, is particularly likely to immunize, because it feeds minute quantities of blood into the bloodstream over a long period of time. But any blood transfusion of incompatible blood is likely to cause immunization, Dr. Levine emphasized.

Dr. Levine hopes that application of his recommendation that no girl baby or young girl should ever be given blood in any way until she is tested for Rh, will save the lives of many babies in the future.

Even a recently recommended biologic test to detect Rh incompatibility can itself serve to immunize, Dr. Levine reported.

Discovery that the incompatible blood of the mother could cause the death of her own baby was not made until eight years ago when Dr. Levine studied the case of a young woman whose second baby was born dead. He found that the mother's blood would not mix with that of the father although both had group O blood. That was the first clue to the medical puzzle of why many families had been able to have one child and never any more that would live until birth or beyond the first few days of life.

Science News Letter, August 4, 1945

Indium, a minor metal, is proving useful in bearings; when plated on the face of the bearing and heated, it diffuses into the surface and retards wearing thus prolonging the life of the bearing.

ENGINEERING-PHARMACY

Quinine from Green Bark

New portable extraction plant can take malaria-fighting drug and other important chemicals from cinchona trees where they grow in inaccessible forests.

See Front Cover

➤ A NEW weapon against malaria, promising better health to millions of civilians in the Americas, has been developed by the Cinchona Research Unit of the Engineer Board, U. S. Army. Major Robert Lee Kaye is commanding officer of the Unit and Lt. Silvio E. Ronzone is executive officer.

The weapon consists of a portable plant for extracting quinine and other anti-malaria drugs from the bark of the cinchona trees on the spot where they grow in almost impenetrable forests of Latin America.

If the portable extraction plants had been available before Pearl Harbor, they might have been used to produce, from cinchona trees growing in the Philippines, medicine for the malaria victims among the defenders of Bataan.

The medicine these portable plants extract is totaquina. Totaquina contains quinine and other related chemicals, called alkaloids, found in cinchona bark. It is considered a satisfactory remedy for malaria, though opinions may differ on its value compared to quinine and atabrine, the synthetic chemical now chiefly used for treating malaria.

A specific remedy for one form of heart disease is among the alkaloids of the cinchona bark. This drug, quinidine, has been very scarce since the Dutch cinchona plantations on Java were lost to the Japs. More quinidine for heart disease patients seems on the way, through the Engineer Board's cinchona extraction plants.

One of these cinchona extraction plants was recently exhibited in one of the Engineer Board's laboratories. Four of them will shortly be shipped to Latin American countries. One is destined for permanent location in Costa Rica, where the War Department and the Foreign Economic Administration have developed a cinchona plantation from seeds developed in the Philippines by Col. Arthur E. Fischer and flown out by him just prior to the Japanese occupation.

The plant consists of three fabric bags, shoulder-high and about as wide, jungle-green in color, watertight and resistant to acid and alkali. With these are three tall metal cylinders, three smaller fabric bags suspended from an overhead wooden rack, a small gasoline motor pump and a set of fabric drying trays, racked one above another with space between to reach about shoulder height.

The whole thing weighs 1,500 pounds and the necessary chemicals for one month's operation weigh another 1,000 pounds. The plant breaks down into units small enough for mules or men to carry over the mountain trails through the Andean rain forests. It can be operated by one intelligent man with the assistance of native laborers. Names of different parts of the equipment are painted on in Spanish, and some parts are painted in different colors for ease in directing operations by those who cannot read.

The principle of operation, and the key to the success of the plant, is contained in the tall metal cylinders known as ion exchangers. In these are fine particles of material which looks like charcoal but is not. The name of the material is a military secret, because the Army also uses it for many other purposes. It is no secret that this and similar materials from coal or resins can adsorb either negatively or positively charged ions, according to the electric charges they carry. Charcoal can be made to do this, too.

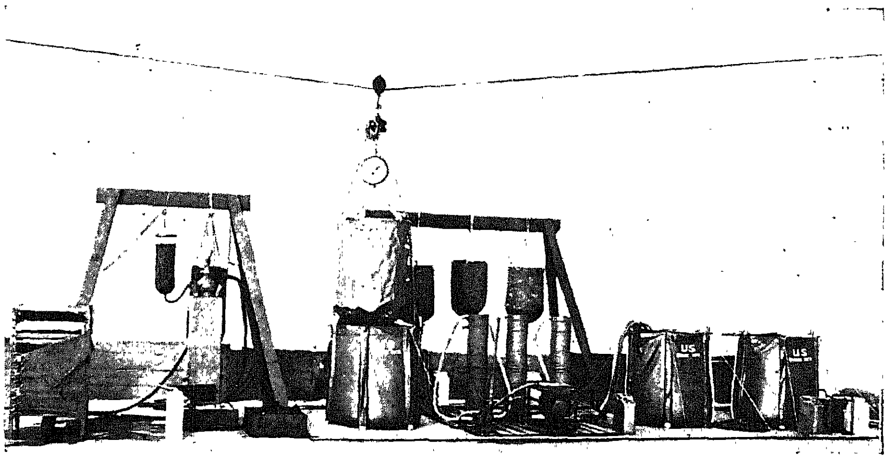
Unlike charcoal, however, the ion exchanger used for totaquina extraction will, when sodium hydroxide is added, reverse its tendency and drop the positively or negatively charged particles. Alkaloids such as quinine behave as cations, carrying positive charges, when in acid solution. This was discovered accidentally by chemists working on the purification of alkaloids.

The fresh cinchona bark, therefore, is cut into small pieces and dropped into an acid in one of the big jungle-green bags and the mash agitated long enough to extract and charge the alkaloids. It is then pumped through the cylinders containing the ion-exchange material. Alkali is added to release the alkaloids; next alcohol is added, and the dark wine-red liquid is poured on the drying screens. From these it is collected as a pinkish powder which can be further refined to white. This is totaquina. Even a tiny pinch has the bitter taste characteristic of quinine.

Totaquina can also be extracted from the bark by treating with acid and alkali alone. This "bathtub" method, as the Army engineers call it, is much less efficient, but can be used with very simple equipment. Old porcelain-lined bathtubs could literally be used, or barrels or pottery jars. Vinegar might furnish the acid. For a small health center it might be efficient enough and the cost would be very low.

Another extraction plant has also been developed by the Army for use with a hand pump instead of a gasoline motor.

All these methods were designed for



PORTABLE PLANT—Totaquina for treating malaria can be extracted from fresh green cinchona bark in the forests where the trees grow with this 1,500-pound, portable extraction plant developed by the Engineer Board, U.S. Army.

HARVESTING—"Quineros" strip cinchona trees of their bark for use in making anti-malaria drugs.

extracting the malaria drugs from fresh, green cinchona bark. This is where a great saving in money is made. The Dutch got quinine from cultivated cinchona trees yielding a high percentage of quinine and growing in accessible plantations. Cinchona trees are native to Latin American countries, but grow in dense forests that can only be reached over rough, muddy mountain trails.

Totaquina and quinine have previously been extracted only from dried, ground bark. That meant, in the case of the Latin America trees, packing the bark out by mule or man-carry over indescribably difficult trails. The bark could not be dried where the trees grow because of the constant rainfall. One ton of the dried bark, which cost $65 to ship from a Latin American port of embarkation to the United States, might not yield as much as 40 pounds of quinine alkaloids. One of the difficult trails is shown on the cover of this SCIENCE NEWS LETTER.

Totaquina has long been known as "the poor man's quinine." Its present cost, when made from dried bark shipped to this country, is $16 per thousand doses, or about one and one-half cents per dose. Most of the 300,000,000 malaria sufferers in the world each year cannot afford any such expensive medicine. If they use totaquina, they use a home-brewed tea and cover the taste, if possible, with alcoholic beverages of some kind, which, incidentally, helps to extract more totaquina.

Quinine, selling at $90 per 1,000 doses when the government last bought any, and atabrine, even at the present government price for large quantities of $4 per 1,000 doses, are also out of reach of the poor people in malaria regions who need a malaria medicine most.

Totaquina can be produced from fresh bark on the spot by the Engineer Board's new method, however, at a cost of $3.80 per 1,000 doses. This is about one-third of a cent per dose, and atabrine bought by individual patients in retail quantities today would cost about four cents a dose. The Engineer Board's third-of-a-cent per dose figure, moreover, is based on U. S. labor costs with the gasoline motor ion exchange process. The "bathtub" process, with native labor, should bring the price down much lower.

Science News Letter, August 4, 1945

PUBLIC HEALTH

Polio Cases Increase Throughout Nation

➤ INFANTILE paralysis cases increased throughout the nation during the week ending July 21. The total number reported to the U. S. Public Health Service was 369. The total for the previous week was 254.

The 369 figure, however, is considerably below the 568 cases reported for the corresponding week last year.

States reporting the largest increases were New York, New Jersey, Pennsylvania, Virginia, Massachusetts and Texas. Tennessee, where cases had begun to swing up, reported a slight decrease.

Science News Letter, August 4, 1945

As seeds respire, they will not *germinate* unless they have a sufficient supply of oxygen.

New stainless steel *vacuum containers*, used to carry hot soups and cold beverages for passengers in airplanes, weigh one-half as much as those formerly used and protect the temperature of the liquids at any altitude.

SCIENCE NEWS LETTER
Vol. 48 AUGUST 4, 1945 *No. 5*

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AERONAUTICS

New Giant Bomber

The B-32 weighs 50 tons, has a speed of more than 300 miles an hour, has four 2200-horsepower motors and propellers nearly 17 feet in diameter.

➤ THE ARMY's newest heavy bomber, the B-32, built by the Consolidated-Vultee Aircraft Corporation in Fort Worth, has been partially stripped of its veil of wartime secrecy.

Designed for a normal gross weight of 50 tons, the B-32 has a speed of more than 300 miles per hour. It has four 18-cylinder, 2200-horsepower Wright Cyclone engines, equipped with eight turbo-superchargers. During the landing run the huge 16-foot, 8-inch Curtiss electric reversible-pitch propellers can be reversed to enable the plane to land on a shorter runway and increase its maneuverability during ground operation. They are the largest-diameter propellers installed on any production airplane.

Physically, the B-32 has a length of 83 feet, 1 inch, stands 32 feet, 2 inches high on retractable tricycle landing gear equipped with dual 56-inch tires on the landing wheel and 39-inch tires on the nose wheel. The spread of the low-drag Davis wing is 135 feet, only a few feet shorter than that of the Superfortress.

The fuselage of the B-32 is an all-metal, semi-monocoque design, covered with a smooth aluminum alloy stressed skin of various thicknesses. At the thinnest point the skin is only 25 thousandths of an inch thick. Eight men comprise the crew, working in forward and after cabins, with a double bomb bay arranged in tandem in the center.

"The B-32 is a roomy and comfortable plane to work in," Convair officials report. "The bombardier's head clearance is about 4 feet, 6 inches. The flight deck is 14 feet, 6 inches long, and has a head clearance of over 6 feet. The cabin is kept cosily warm by heat supplied by the engines. Although originally designed to have a pressurized cabin and central fire control system like that in the B-29, the B-32 has high-altitude oxygen systems to replace pressurization, thereby making it possible for gunners to take their position in turrets at any time. Gun turrets replace the fire control system."

The use of high-altitude oxygen systems eliminates the danger present in a B-29 when it enters "flak alley". If flak bursts through the skin of a Superfortress the decompression is explosive, sometimes blowing crew members through the plexiglas blisters.

The Davis high-lift, low-drag, long-range wing gives the B-32 a very long range. Heated air from the engine exhaust passes through the leading edge of the wing, amounting to nearly 1,500,000 B.T.U. an hour, or enough heat to make 25 average five-room homes comfortable. This heat prevents ice from forming on the wing. The B-32 is a true all-weather ship, capable of flying under conditions that normally would ground any other type of plane.

To the casual viewer, probably the most impressive thing about the B-32 is the giant single tail. A number of types of tail structures were experimented with in the design of the plane, including a twin tail, such as is used on the B-24 Liberator, and the Boeing B-29 tail. Best results were achieved with the B-29 tail design. The Army wanted to use the B-29 tail so that the structures on the two planes could be interchanged. However, in order to give the pilots plenty of rudder for take-off it was necessary to increase the height of the vertical section of the B-29 tail by about five feet. Other minor revisions were also necessary in the elevators and coupling of the tail structures. Thus, while the present tail structure of the B-32 resembles that of the B-29, it is bigger.

As present, rubber boots are installed on the leading edges of the tail structure to break off ice formations that occur at high altitudes. Soon, however, B-32s will be equipped with heated tail structures that prevent the formation of ice, using engine exhaust heat such as that now piped through the wing.

The B-32's hydraulic system, which controls the operation of the oxygen system and some other parts, is powerful enough to raise a passenger automobile 17 stories above ground in one minute. There are about seven miles of wire in the electrical system, ranging in size from 3/22 inch to the size of a man's thumb.

Maintenance on the ground is made easier on the B-32 than on any other four-engine bomber in use today. The four engines are completely interchangeable. A large trapezoidal door at the top of each engine nacelle allows a n actually to enter the engine housing work on it.

The four engine nacelles or housings are adaptations of a British design called the "power egg." Exclusive on the B-32, engineers found the power egg, with each nacelle ending in a point behind the trailing edge of the wing flap, the most efficient design to use with the low-drag wing. The engine nacelles are divided at the point where the wing-flaps are joined to the wing, so that they do not interfere with flap operation.

Science News Letter, August 4, 1945

ENGINEERING

Blind Civilians Inspect Precision Roller Bearings

➤ BLIND civilians, with the use of a new electronic precision gaging device, are able to inspect with accuracy the outside diameters of roller bearings, in a plant of the Timken Roller Bearing Company in Canton, Ohio, to determine if they are the exact size required. Three notes from a loud-speaker on the back of the operator's chair indicate whether a bearing passing through the measuring device is of correct size, oversize or undersize.

Diameters of rolls, cones and cups for precision bearings are ground within very close limits of their specified sizes. Each part is then checked for size by operators using electrical or mechanical dial-type indicators. These indicators show any variation in the diameter of the work-piece being checked. Parts with diameters over or under the specified size limit, or parts out of round, are readily detected and removed.

To enable a blind person to do this identical work with the same accuracy, a sound indicator is used on the same type of gage. The small conical loud-speaker mounted on the back of the operator's chair gives a high note if the article is oversize, a low note if undersize, and a "middle" note if dimensions are correct.

The three notes are produced by an electronic oscillator which is controlled by relays connected to three indicator lights of the electronic gaging system. The three lights correspond to the three notes of the sound device. Chief purpose of the lights is to give the lineman a quick visual check on the gage's efficiency. The gage can be made to give both a visual and sound indication as close as one five-millionth of an inch over or under a specified diameter tolerance.

Science News Letter, August 4, 1945

NUTRITION

10-in-1 Ration a Success

Army substitute for monotonous C and K rations for fighting men in the field contains such delicacies as pork and applesauce and fruit bars.

➤ THE ARMY's famous and successful ten-in-one ration was developed after experience in the African campaign showed the need for special rations during the period between landing operations and the expansion of the beachheads gained, it is explained in a report released by the Senate subcommittee on war mobilization, known also as the Kilgore committee. Senator Harley M. Kilgore of West Virginia is chairman.

It takes from 30 to 60 days to place in operation the B ration, composed of 125 items and requiring kitchen equipment and a long, well-integrated and complex supply system. As a result, troops in offensive operations had to live one or two months or longer on C or K rations. Although sufficiently nourishing, these became so monotonous that the men frequently could not eat enough of them to get enough food for prolonged top efficiency.

Antiaircraft gun crews, searchlight crews and other troops stationed far from the base camp and messing facilities also had to get along on the monotonous C and K rations. Tanks and other vehicles upon reaching their night bivouac are scattered over such wide distances, as a precaution against bombing, that they could not well be fed from regular messes.

These and similar conditions of modern warfare showed that rations developed before Pearl Harbor were not suitable to all circumstances. The Quartermaster Corps got to work, with an appropriation of $50,000 plus research aid furnished gratis by cereal manufacturers and meat packers, and in August, 1943, the first ten-in-one rations were produced.

They met with tremendous enthusiasm when issued to troops in the Italian campaign. These men had fought through the Sicilian campaign of approximately 42 days. During 38 of these days, they had existed on C and K rations, because the B ration could not be moved up any sooner. Their response to the ten-in-one ration in the Italian campaign has been equalled by that of troops using it in the European campaign.

The ten-in-one ration is packed in waterproof asphalt, laminated fiber cartons that will withstand 18 to 24 hours immersion in seawater without any damage to the contents and floats just awash.

Each carton contains rations for 10 men for one day, or for five men for two days, one man for 10 days or any similar combination. There are five separate menus. Latest specifications call for five types of ready-to-eat cereal, 17 different meat items, three different cheese products, five different vegetables, four different types of biscuits and five different beverages.

The biscuits, used instead of bread in combat rations, are highly nourishing and greatly improved in palatability over hardtack.

Outstanding among confections, the Kilgore committee reports, is the fruit bar developed by the Army from the ground up. Nothing in commercial existence even approached this type of product. Because commercial candies would not stand the rigors of high-temperature storage, new types of high-melting chocolate candies and coatings were developed.

The Army had also to initiate the development of new types of canned meats, since few of the commercially available ones were satisfactory for Army use and their variety was extremely limited from an Army viewpoint. As a result there were developed, among others, canned hamburgers, dehydrated corned beef hash, dehydrated meat and rice, pork and corn, improved roast beef, pork and applesauce, ham and raisin sauce, and ham and sweet potatoes.

Science News Letter, August 4, 1945

ENGINEERING

Transportable Power Plants Being Shipped to Europe

➤ UNIT transportable electrical power plants, complete with generator, steam turbine, boiler and other necessary parts, are being shipped to Europe to furnish power in bombed-out regions to help the return to normal industrial production, it is announced by William E. Knox of the Westinghouse Electric International Company. The units are of two sizes, one with a capacity of 2,000 kilowatts, the other half as large.

The idea of a compact power-producing unit first was conceived by Mr. Knox for use in China, following a trip to that country in 1939. The Chinese, forced back into the interior by the Japs from their coastal industrial cities, needed a quick means of generating electric power for war production. Westinghouse designed units that could operate on locally abundant low-grade coal and models that were built to burn lignite, oil, wood, and even peat.

The European war created another demand. A semi-portable design was perfected that could be assembled in a minimum of time. To meet the emergency requirements of rehabilitation a design was made that simplifies the arrangement of the major parts and eliminates all dispensable refinements.

Westinghouse unit steam power plants of various types have been purchased for use in Russia, Italy, the Netherlands, French North Africa, China and South America, he said. In the Netherlands they are furnishing power for electrical equipment to pump back into the sea the salt waters let in when the Nazis destroyed the protecting dikes.

Science News Letter, August 4, 1945

ORDNANCE

Tear-Gas Grenade Has Baseball's Size and Shape

➤ A NEW BASEBALL grenade, that any young American can throw without training because he already knows how to peg one from center-field to home-plate, has just been adopted by the Army's Chemical Warfare Service. It is charged with a new-type tear-gas, and is intended primarily for use by the Corps of Military Police, in dispersing mobs and quelling incipient riots.

In use, the grenade is grasped in the hand, with thumb or index finger over a projecting plug. The soldier pulls a safety pin, then throws the grenade exactly as he would a baseball. As soon as the missile leaves his hand, the plug is forced out by a spring, and a two-second fuse is set in action.

When the fuse functions, it explodes a very small bursting charge, just sufficient to break the thin plastic casing like an eggshell and scatter the tear-gas contents in the form of an invisibly fine powder spray or aerosol. Action is instantaneous; there is no chance for members of the crowd to run out of range, as sometimes happens with the present slower-fuming tear-gas grenades.

Science News Letter, August 4, 1945

CHEMISTRY

Tung Oil Replacement

Pentaerythritol, that puts the bang in bazooka, will have major peacetime use in varnishes and resins. Much less expensive than tung oil.

➤ THE same stuff that puts such a "bang" in the bazooka's tank-killing rocket projectiles, given different chemical handling, becomes an excellent material for varnishes and other coating resins, at least partially replacing the war-scarce tung oil.

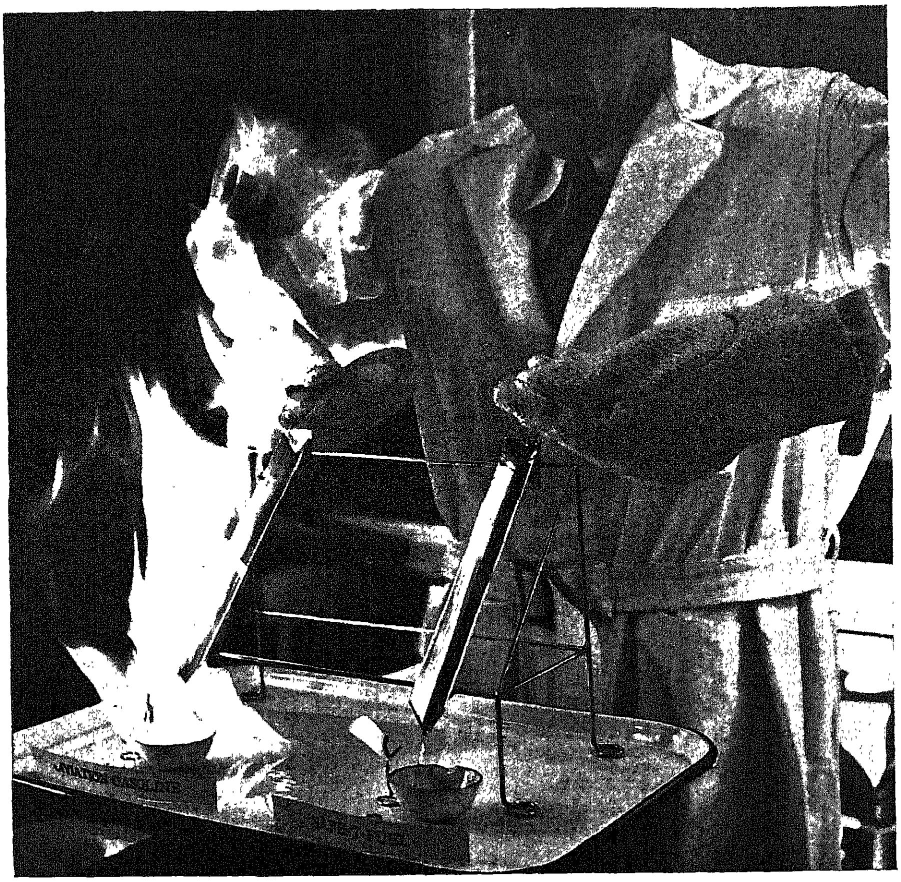
The compound's name is pentaerythritol. Although it is a dry white powder at ordinary temperatures, it is chemically classified as an alcohol. It is made synthetically from formaldehyde and acetaldehyde, which themselves are synthetic compounds, so that its supply is not so likely to be diminished or disturbed by either war or weather as are supplies of imported natural products like tung oil.

Moreover, it is relatively low-priced. In 1940, drying oils based on pentaerythritol could be bought for 11 to 15 cents a pound, while tung oil was selling at 18 to 24 cents a pound. Since war demands have brought about a great increase in pentaerythritol production, it is likely that this favorable price differential can be increased when it is no longer needed for loading rockets, shells and mines.

As used in bazooka projectiles and other military missiles, the compound has four nitrogen-containing atomic groups attached to it. These convert it into pentaerythritol tetranitrate, referred to as PETN for convenience; this is an explosive so violent that TNT is usually added to it to slow it down a little, and make it less "touchy".

For use as a varnish, pentaerythritol is combined with rosin acids, fatty acids or other organic chemicals. Thus treated, it is said to be able to hold its own in competition with the older coatings made with tung or other vegetable oils.

Science News Letter, August 4, 1945



SAFETY GAS—On the right is the new fuel produced by the Standard Oil Company, New Jersey. The safety feature is due to the fact that inflammable vapors are not produced in large quantities in the air. When a match is dropped into ordinary gas (left), a fire results.

CHEMISTRY

Lighted Match Can Be Put Into New Safety Fuel

➤ A NEW safety fuel for aircraft, so resistant to accidental ignition that a lighted match can be dropped into it without causing a fire, was announced and its properties demonstrated to a group of scientists in New York. It has all the power of 100 octane fuel, extended tests in a high-powered airplane engine show.

The new safety fuel is a development of the Standard Oil Company of New Jersey, and the demonstration was made by technical men of that company and of Pan American World Airways. The chief engineer of the latter company pronounced it to be "an important technical advance in aviation."

The safety feature of the new fuel is due to the fact that it does not form inflammable vapors in the air in great enough quantities to ignite, unless it is at temperatures above 100 degrees Fahrenheit. Ordinary motor and aircraft gasolines do, and they ignite readily and burn rapidly because of the vapors formed.

The new fuel, however, must be fed into the engine by direct injection rather than by ordinary carburetion such as is used with conventional gasolines. Unless suitable carburetors are developed, engines now in use will have to be converted for fuel injection if the new fuel is to be used. After the fuel is injected in the cylinder, it is vaporized by the heat developed during compression. The fuel mixture is fired by the conventional spark plug.

Science News Letter, August 4, 1945

Gallium, a little known chemical element, is 150 times as abundant as silver.

Expansion spaces between the ends of the rails on a railroad are not necessary if the rails are welded and rigidly confined against buckling; the rails merely develop compression in heat and tension in cold, but both within safe limits.

MEDICINE

Backache in Some Cases Relieved by Operation

➤ SOME of the many backache sufferers in the world may have their pain because a small tumor of fat has bulged, like a hernia or rupture, through the bands of tissue covering the muscles in the lower back.

In six such cases, some with such severe pain they could not get out of bed or turn over, operation to remove the fat tumor brought speedy relief, Dr. Ralph Herz of Cleveland reports. (*Journal, American Medical Association,* July 28)

The operation is not a panacea for all types of backaches, he warns. There are many causes of back pain for which there are standard treatments. In many cases, however, the cause remains hidden in spite of careful searching, and these patients go on having their backaches with little or no relief from the usual treatments. In some of these, perhaps a fairly large proportion, Dr. Herz suggests, the cause may be the fat tumors herniating through the bands of tissue that cover and connect muscle, known as fascia.

The little tumors or masses can usually be detected by feeling for them. Pressure on them produces the sever pain the patient has complained of, including in some cases radiation of the pain down the leg. Injections of anesthetic solution around the mass or tumor bring prompt but temporary relief of the pain. This relief following injection of anesthetic, however, confirms the diagnosis.

After Dr. Herz had operated on three patients he found that Drs. W. S. C. Copeman and W. L. Ackerman had reported 10 similar cases among men in the armed forces. All of these patients also had striking relief after the fatty tumors had been removed.

Science News Letter, August 4, 1945

NUTRITION

Electronic Blanching Destroys Less Vitamin

➤ A REVOLUTION in the preparation of fresh vegetables for either quick-freezing or dehydration is pending, if experiments carried on at the New York State Experiment Station by Dr. James C. Moyer and Dr. Elmer Stotz prove applicable on a commercial scale.

A necessary step in the processing of vegetables for either type of preservation is known as blanching. It consists in a brief application of heat to stop the action of the plant's own enzymes, which would otherwise produce a kind of self-digestion, spoiling both flavor and food value. Blanching is now done either by steaming or dipping in scalding water.

Because both present methods of blanching cause material decreases in the vegetables' content of vitamins, especially carotin and ascorbic acid, Drs. Moyer and Stotz decided to test the possibilities of electronic heating. They exposed samples of shredded cabbage to the action of a high-frequency field for two and one-half minutes, while similar samples from the same head were put through the conventional steam and hot-water blanching processes.

Tests for ascorbic acid, before and after blanching, showed that whereas the samples treated with steam lost 32% of this important vitamin, and those scalded in hot water lost 40%, the electronically blanched cabbage lost only 3%.

In announcing the results of these preliminary experiments (*Science,* July 20) Drs. Moyer and Stotz state also that they have tried out their method on other vegetables, and that further and more extensive studies are now in progress.

Science News Letter, August 4, 1945

METALLURGY

Magnesium Smelted Right Out of Silicate Ores

➤ MAGNESIUM, the light metal that has revolutionized airplane construction since the beginning of the war, can be smelted directly out of magnesium-silicate ores by a new process on which U. S. patent, 2,379,576 has been issued, to Dr. Fritz J. Hansgirg, Austrian-born metallurgist who has already made notable contributions to American war industries. Dr. Hansgirg is at present carrying on his researches at Black Mountain College, in North Carolina.

The siliceous ore is crushed and mixed with powdered coke, and the mixture is pressed into tablets with coal tar as a binder. The tablets are heated in a rotating kiln, until the silicon comes out of the compound in pure elemental state, leaving the magnesium still combined with oxygen. The partly reduced ore is again pressed into tablets, this time with the addition of calcined lime. Heated to a high temperature in a high-vacuum retort, the silicon combines with the oxygen of the partly reduced ore and with the lime, forming calcium silicate, which is useful in glass-making. The magnesium comes out as the pure metal.

Science News Letter, August 4, 1945

IN SCIENC

MEDICINE

Penicillin Fails as Spotted Fever Remedy

➤ HOPE that penicillin might prove an effective remedy for Rocky Mountain spotted fever seems considerably dimmed by a study reported by Dr. Florence K. Fitzpatrick, of the medical research division of Sharp and Dohme (*Science,* July 27).

Six guinea pigs infected with the disease were given penicillin in amounts believed large enough to bring about recovery if the mold chemical had any value in this disease. All six died. Of 16 infected animals getting no specific treatment, eight survived and eight died. Another six were given spotted fever rabbit immune serum. All these survived.

Science News Letter, August 4, 1945

ENGINEERING

Fluorescein Detects Leaks In Pipeline Under Channel

➤ THE CHEMICAL compound, fluorescein, used by airmen forced down at sea to color the surface water around their rubber rafts and mark their locations, also played an important part in locating leaks in the pipelines laid under the English Channel from England to France to supply the Allies in Normandy with gasoline and oil.

Fluorescein on the surface of seawater produces a large colored patch visible at great distances to patrolling aircraft or surface ships. It occurred to authorities that a solution of the same chemical pumped through a fractured pipeline would rise to the surface of the water at the break, thus revealing its position.

The scheme proved successful, although a special solution of the chemical had to be developed and large quantities prepared. It was pumped into the English end of a damaged pipeline, and in due time aircraft and ships noted a large colored patch on the surface that located one end of the broken pipe. To locate the other end of the break, quantities of the solution were taken to France and pumped into the French end of the line. With the two ends of the fracture located, repairs were easily made. The method was employed several times on later breaks.

Science News Letter, August 4, 1945

E FIELDS

PLANT PATHOLOGY

Sulfur Compounds Check Fungi Causing Orange Decay

➤ ORANGES may be prevented from decaying, with consequent large savings both nutritional and financial, by means of several sulfur-containing organic compounds investigated by Dr. J. F. L. Childs and Dr. E. A. Siegler, of the U. S. Department of Agriculture, at the Federal experiment station at Orlando, Florida (*Science*, July 20).

Most of the storage and market spoilage of oranges is traceable to two kinds of fungi that cause stem-end rot and two others that are known respectively as blue and green molds. Damage by all four of these fungi was cut down very materially by three compounds, all characterized by the presence of sulfur in combination with nitrogen-containing atomic structures known as amino groups.

Untreated lots of oranges exposed to the same conditions of infection underwent decay in percentages ranging from 32.9 to 42.2. Oranges treated with a 5% solution of thioacetamide produced only 1.7% of decayed specimens. Treatment with 8-hydroxyquinoline sulfate and 2-aminothiazole, in the same strength, was not quite so effective, but still reduced decay to a fraction of what it was in untreated oranges.

Science News Letter, August 4, 1945

PLANT PATHOLOGY

Brown Berry Proven to Be Serious Virus Disease

➤ BROWN BERRY, a plant ailment attacking black raspberries, and hitherto regarded merely as a physiological response to unfavorable environmental conditions, is actually a serious virus disease, Dr. George L. Zundel of the Pennsylvania State College has discovered. He has also found that mild streak, long considered a distinct disease and known to be caused by a virus, is another symptom of the brown-berry infection.

For the present, Dr. Zundel thinks, plant pathologists will apply the hyphenated brown berry-mild streak combination name to the disease, and that later a more appropriate name may be devised.

Not satisfied with the accepted belief that brown berry resulted from drought, frost, lack of pollination, or some other "catch-all" environmental factor, Dr. Zundel made a study of the disease. This led to observations which later were confirmed through grafting operations with the aid of experiment experts.

Although satisfied that environmental conditions alone do not cause the disease, Dr. Zundel does not rule out the possibility that environment plays a role in its development since the disease has been observed more generally in low places and near wooded areas.

Because the disease does not strike entire raspberry patches uniformly, Dr. Zundel prefers to leave it to the grower's judgment as to whether he wants to rogue out all of his plants, or just those most severely affected. Plants less seriously affected, he reasons, may return at least a part of a crop while new and disease-free plantings are getting established elsewhere.

Roguing out, he explains, is the most effective control measure, followed, of course, by the use only of plants that are known to be disease-free. Where stock is obtained from nurseries which do not originate their own plants, he advises tracing the plants through all handlers to their origin.

Science News Letter, August 4, 1945

INVENTION

Yoke-Type Life Preserver For Soldiers at Sea

➤ AMERICAN soldiers crossing the ocean on transport vessels are now being provided with a new yoke-type life preserver, designed to wear with full infantry equipment, developed by the U. S. Navy. It is made of kapok, and will replace the present carbon dioxide dual-tube life belt which is worn with difficulty by a soldier laden with a full pack and equipment.

The new preserver, perfected as a result of extensive tests, is worn over the neck and is adjusted by combination leg and waist straps. A soldier's pack can be removed without taking off the life preserver. Also the preserver can be removed without interfering with the pack. It will support a man in the water equipped with helmet, rifle, ammunition and pack.

Because of the scarcity of kapok and other materials used in its manufacture, the new preservers are issued only to troops in troop-carrying vessels.

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SEISMOLOGY

Carolina-Georgia Area Reports Earthquake

➤ THE EARTHQUAKE reported from towns over a fairly wide area in the western Carolinas and northern Georgia on Thursday, July 26, apparently was one of a long succession of mild shocks that have been felt from time to time in the Southern Appalachians, seismologists of the U. S. Coast and Geodetic Survey told Science Service. From there, the spots on the epicenter map "scatter out like birdshot" up the whole mountain system as far as New England, then swing towards the northwest, up into the Canadian highlands.

None of these earthquakes in the southern mountains has ever been reported as serious.

Quite different was the story of the Southeast's one really major earthquake, which hit Charleston, S. C., in 1886. This was a real "smasher", and it practically wiped out the city. This, however, seems to have been strictly a coastal-plain affair, having no connection with geological events in the mountains.

Ever since the Charleston earthquake, there have been minor tremors from time to time, centering in the immediate neighborhood of Summerville, about 25 miles northwest of Charleston.

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GENERAL SCIENCE

Boys and Girls Exceed Milkweed Floss Quota

➤ CREDITING the assistance of the Science Clubs of America with its 7,000 clubs in the nation's high schools for a part in the achievement, the War Administration has announced that the program last year for the collection of milkweed floss was entirely successful. More than 1,700,000 pounds of the floss were gathered, whereas the quota set by the War Production Board was 1,500,000 pounds. Milkweed floss was needed as a substitute for kapok for use in life preservers.

In the past few months the situation has changed materially as substantial quantities of kapok are now being received from the Philippines and other South Pacific islands. These supplies, together with the milkweed floss on hand, are expected to take care of the situation permanently.

No milkweed pod collecting program for 1946 is being planned as a result.

Science News Letter, August 4, 1945

PHYSIOLOGY

Working in Comfort

Heat, but also moisture in the air, wind and your own activity contribute to summer discomfort. High pulse rate a danger signal.

By MARTHA G. MORROW

➤ TO BE comfortable in the summer's heat, you work only about one-fifth as hard as you would if you were doing your utmost. That is science's latest finding.

People begin to feel uncomfortable, and want to slow down on the physical exertion, when they are doing only one-quarter of what they are humanly capable of doing. But if they keep on going, they will soon get their "second wind" and can continue to work without discomfort.

A person's comfort as far as physical activity is concerned—and comfort is very important to all of us—can actually be measured, the Quartermaster Corps of the Army found while trying to determine how much work our soldiers could safely do in different climates. They found that a person's degree of comfort is the ratio of what a man is doing in a given environment to what he can do in that same environment.

Irrespective of whether a person is taking violent exercise on a cool summer day or whether he is sitting still when the day is oppressively hot, a person's comfort increases with the amount of heat the air can take up from his body and his comfort decreases with the heat that is generated by his body.

The high relative humidity of the air, which many of us take as a signal on a hot day for complaining about the heat, may mean that it will probably rain, but has little real relation to how we feel. What is important to us is the actual amount of water vapor in the air, or absolute humidity.

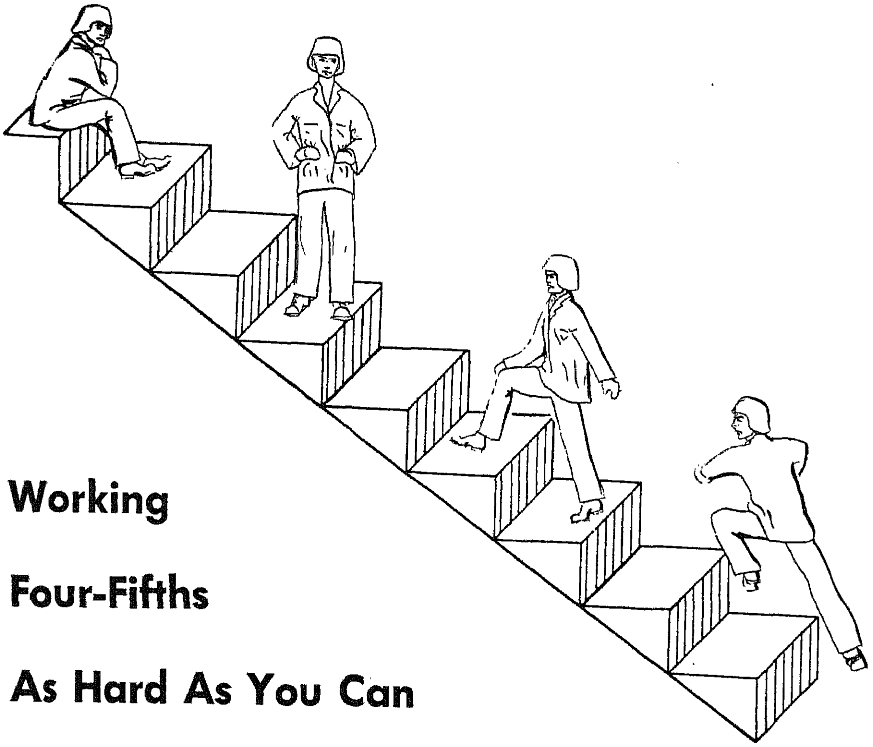
It is almost twice as hard to evaporate the moisture from your body when the temperature of the atmosphere is around 90 degrees Fahrenheit as it is when the temperature is at 70 degrees, even though in both cases the relative humidity is 90%, because the absolute amount of moisture in the air is greater in the first instance than in the second.

The amount of heat created by the human body in digging a ditch, marching, driving a truck, just sitting still or sleeping must be lost into the surrounding air, or a person will suffer. If the air temperature is cooler than the body, this heat may be carried away by the convection currents of wind, by evaporation of sweat, or by radiation to cold ground or sky. If the air temperature is about that of the body, wind and sun will add heat, but evaporation is usually able to dispel it too.

Moisture Loss Serious

The amount of moisture that a person loses through the evaporation of sweat can be measured by his loss in weight. Under comfortable conditions, men give off about 50 grams (that's slightly less than two ounces) of moisture an hour. When they lose as much as 450 grams or about 16 ounces an hour, they begin to get uncomfortable. But if these same men can get plenty of water to drink, they can lose as much as 1500 grams or about 3½ pounds of moisture an hour without suffering any serious difficulties.

Danger points, beyond which a person should not go for safety, have been determined by a group of experts at the Quartermaster Corps as follows: When the pulse rate reaches 130 to 140 beats a minute—watch out. Even if a person is drinking plenty of water, when he is sweating away 1500 grams of moisture an hour, he should cease whatever he is doing and rest for a while. Another danger point is reached when the rectal temperature, which pretty well shows the temperature of the interior of your body, reaches 101.4 degrees Fahrenheit. Danger may be reflected in these ways or several others, but any one of them should serve as warning. A man can go above these warning regions without harm for



MOUNTAIN CLIMBING—Although the temperature may remain at 97 degrees Fahrenheit, as the amount of moisture in the air increases, the amount of physical labor which a man can safely do rapidly decreases, as shown in this Army chart from the office of the Quartermaster General.

short periods, but it is dangerous for him to continue there long.

These danger points may find a practical application in industry or the services. An officer on the march would know that his men must have a rest, for instance, when their pulse rate gets beyond 130 beats a minute. A steel expert might require his men to leave the heat of the steel furnace when they have sweated away more than a certain amount of their weight for that day.

Even a warm wind cools you, unless you are enduring severe desert conditions. A layer of still air is around everything, clinging close to your arm, pocketbook or table top. Wind erodes the layer of still air and takes away part of the insulation from your body. As long as the temperature of the air is cooler than that of the body, the wind cools you.

On a hot day when the temperature of the air is warmer than that of your body, eroding the layer of air would tend to make you hotter, because it brings the hot air closer to the body. But at the same time the hot wind increases the speed with which moisture is evaporated from your body, which in turn tends to cool you off. In the desert when there is a high wind, however, this is no longer true because then the wind may be demanding from the body more sweat than the body can produce and a person will get the full heating effect of the hot wind.

Damp Clothes Cooling

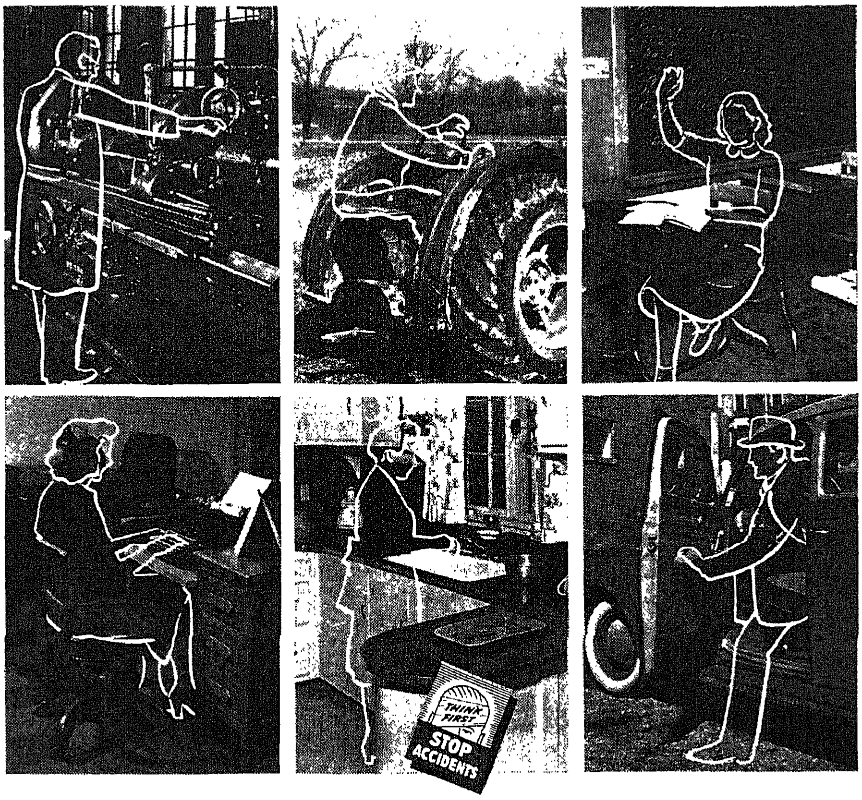
Clothes reduce the amount of heat that can be transferred to the cooler surrounding atmosphere in jungle or humid heat and thus tend to make a person hotter—this is an argument in favor of the now-popular bare legs which women are enjoying as even sheer stockings trap a thin layer of air between the stockings and the legs.

If the clothing is damp, however, and sticking to the body, a person may get almost the full cooling effect of the moisture evaporation. In the full blast of desert heat, and when the man is not exercising energetically, clothes may be a positive help, as they form a resistance barrier to the flow of hot air toward the body. Don't start out without hat or shirt to drive in an open car or jeep across New Mexico or Arizona.

People who are accustomed to the climate will begin to feel uncomfortable indoors, even if they are themselves just sitting in their office, when the relative humidity is 90% if the temperature gets above 87 degrees Fahrenheit. Or if it drops to 83 degrees, with the same relative humidity, in absolutely still air, like that of a telephone booth, they will begin to feel almost unbearably hot. They will also be uncomfortable under either of these conditions if they begin to do violent exercise.

On one of these hot summer days if the temperature is 90 degrees and the relative humidity 80%, an office executive doing the usual amount of getting up from his desk, walking around and conferring with others, will be between just plain hot and oppressively so, and probably wish he could think up some excuse for leaving early.

If the thermometer continues to hover around 90 that evening, however, and the amount of moisture in the air remains the same, this same man can play a couple of sets of tennis around six o'clock with a not-too-good opponent without being any worse off, provided the sky is overcast. By running around the court, he will have increased his wind velocity enough to counterbalance for a time the added exertion. But if this same man attempted to play tennis at about two that afternoon, with the



Out of action... *because they didn't see*

More than 350,000 deaths, 1,300,000 permanent disabilities suffered since Pearl Harbor—more than the total of all casualties caused by enemy action—are *due to accidents* in traffic, at home, on the farm, at work. One reason for this appalling toll on needed manpower is faulty eyesight.

You may have visual handicaps of which you are not aware; or you may have vision ideally suited to certain tasks but not to others. Modern optical science has proved these facts, and has developed scientific techniques for correction of almost all visual defects.

"I didn't see" is a poor excuse for anguish to you or your family. Don't take a chance! Only a professional visual check-up can reveal the true condition of your eyesight.

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Do You Know?

Sittard in the Netherlands is supposed to have got its name from Napoleon, who upon his arrival there, according to the story, said "si tard", or "so late."

Toughness in *meat* may be due to the age of the animal when slaughtered, or to the diameter of muscle fibers and of muscle-fiber bundles, and the proportion and distribution of fat within the muscle.

When *alum* is added to raw water it forms little particles, positively charged, which attract to themselves the negatively charged dirt particles, thereby clarifying the water as they settle.

Owing principally to an increase in soda ash and chlorine production, the total output of common *salt* in the United States in 1944 exceeded 16,000,000 tons.

Tetanus antitoxin, used to prevent lockjaw, is an antibody obtained from the blood of horses; unless renewed it gives the human body only ten days' protection.

Corn grown on soil containing the proper fertilizing elements produces a higher percentage of grain to cob than corn grown where these elements are deficient.

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sun beating down upon him, he would be sweltering close to the limits of safety.

A 150-pound soldier carrying a 40-pound pack and marching at three miles an hour under jungle conditions, with no wind blowing, except that created by his body, will be extremely uncomfortable at a temperature of 85 degrees, with 90% relative humidity, whereas a man without a pack would not be as uncomfortable, with the same amount of moisture in the air, until the temperature hits 95. If the GI, on the other hand, received a letter from his girl friend saying she had married someone else or if he hadn't slept well, he might have had to put down his pack before the four hours were up, or drop exhausted.

No conditions anywhere in the world are so bad that you can't walk around and do some shoveling. In the City Deep Mine (recently air-conditioned), Witwatersrand, South Africa, the relative humidity was usually 100% and the temperature about 96 degrees. Yet comparatively few natives were unable to get accustomed eventually to the conditions and work in the mine.

Climbing mountains is considered about the hardest work a person can do as the weight of the human body must actually be lifted from one place to another. When the wind is blowing five miles an hour and the relative humidity is 100%, if the temperature rose above 85 degrees, the man climbing a steep mountain without rest would drop exhausted. Should the temperature rise to 90 degrees and the relative humidity drop to less than 50%, he would have reached his upper limit of comfort and mountain climbing would have become just plain hard work.

When the temperature is around 70, if the wind is blowing at five miles an hour, the relative humidity doesn't matter much because the pressure of the vapor upon your body is low and the wind velocity is great enough to take away the body sweat.

When the wind drops to one mile an hour (such as you get indoors with a fan in the same room, but not turned directly on you), however, a man doing gymnastics in only shorts and shoes would be affected by the moisture in the air unless the temperature dropped to about 60 degrees.

A number of laboratories throughout the country have been studying the amount of work a soldier or civilian can comfortably do under special conditions, but it was at the office of the Quartermaster General in the Climatology Section where Major Paul A. Siple, Dr. Jesse H. Plummer, and Margaret Ionides brought all this information together and correlated it.

The basic information, they state, came from research conducted at the John B. Pierce Laboratory of Physiological Hygiene at New Haven, Conn., but it was necessary to correlate it with the work done by Dr. Sid Robinson, Department of Physiology, University of Indiana, and by many others before it could be used for so many different activities and temperatures.

The temperature of the air, velocity of the wind, vapor pressure (amount of moisture in the air), and the kind of activity a person is doing all influence his comfort. But other factors such as individual differences, acclimatization, dehydration and combat fatigue are also important, worthy of further study and can be analyzed by the same method, experts believe.

After more data have been secured, they state it will be possible to tell a "weak sister" from a "strong brother" and give these differences a numerical value.

Science News Letter, August 4, 1945

NEW "PICK-UP" CANE

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BOTANY

NATURE RAMBLINGS

by Frank Thone

Many in One

➤ LATE SUMMER is the time of the Compositae—that great botanical family that comprises such diverse plants as sunflowers and asters, thistles and ironweed, goldenrod and coneflower, and even cocklebur and ragweed. True, there are plants belonging to this group that begin blossoming early—few spring flowers show their faces before the dandelion, for example—but in general the composites really get going after the sun starts on a southward trek, and keep it up until frost ends the show.

It may surprise persons who are not specifically trained in botany to hear of plants that look so little alike as wild aster and cocklebur as being in the same family. The kinship, however, is pretty well established, and is based primarily on one thing: the tight grouping of a number of small units which are the single flowers into one collective or composite flower head. Whence, incidentally, the name *Compositae*.

The makeup of a composite flower head can be probably most easily studied by taking apart a specimen of the largest of them—a sunflower. Cut or break the big disk of a sunflower in two, and pry out a few of the separate units you will find set in it. You will find that each of these units, which is eventually going to be a sunflower "seed", carries at its top a set of stamens and a two-parted stigma, or pollen-catching organ, and that there is a pair of short chaffy scales outside of these. This is all that remains of the showy parts of the flower, except in the row of units around the rim where the so-called ray flowers are. Here the petals survive; but what appears to be one big petal is really five, joined edge to edge and spread out flat.

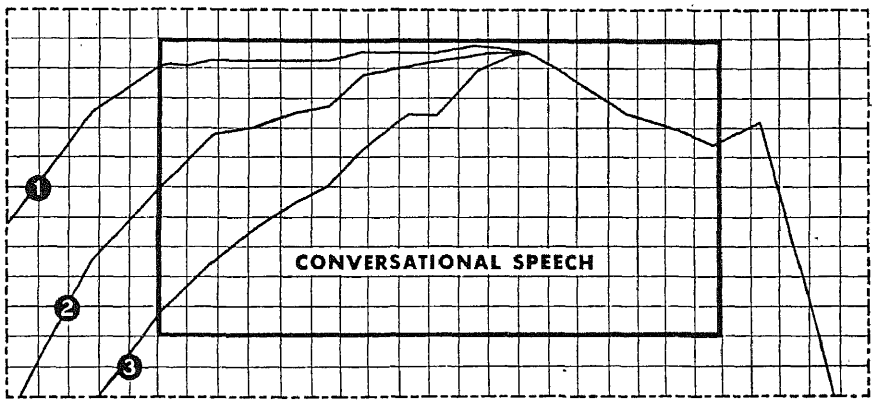
That is a condensed (possibly over-condensed) description of the flower-arrangement in just one kind of composite. There are many variations. The bushy purple head of a thistle, for example, has flowers all alike all over the disk. They all have petals, but these are united into a narrow tube instead of being split along one side and spread out flat, as in the sunflower's ray-flowers. And obnoxious weeds like cocklebur and ragweed have no recognizable petals at all. The number of individual units, or flowers, in a head varies greatly, from several hundreds in a big sunflower down to a few dozens in a wild aster, or even to fewer than that, in the small flower-heads of some of the goldenrods.

Science News Letter, August 4, 1945

The U. S. *Mint* turned out during 1944 approximately 8,000,000 coins for more than a score of friendly nations.

Specially treated *cotton*, made flame-resistant and water-repellent, will probably have wide use in the future for insulation purposes because it is light and highly resistant to the passage of heat.

What Makes a Good Hearing Aid . . . No. 2 of a Series



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FUNCTION of the TONE DISCRIMINATOR

● A tone discriminator is a requisite of a good hearing aid. It is an engineering refinement that makes for more efficient correction of the varying types of hearing loss.

With nerve or mixed impairments, the hard of hearing can hear low frequency sound—need amplification of high frequency sound. A tone discriminator should give selective elimination of low frequency sounds for a more balanced correction of such hearing impairments.

With conductive type of hearing loss, the hard of hearing often find room noise, office clatter, traffic rumble and other low frequency noise distracting. A tone discriminator should enable them to "tune out" or reduce these annoying low frequency noises—and still hear speech and other desirable higher frequency sounds.

The chart above shows how a well-engineered tone discriminator should moderate or almost entirely eliminate undesirable low frequency sounds, while desirable higher frequency sounds are still amplified for clarity.

THE WESTERN ELECTRIC is one hearing aid that has been engineered with a practical, readily adjustable, three-position tone discriminator of the type shown in the chart.

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PSYCHIATRY

Better NP Care Planned

Ways proposed for taking care of veterans and servicemen with limited facilities. Would give courses to general practitioners.

➤ WAYS of stretching and increasing the nation's psychiatric resources to meet present and future needs, particularly those of servicemen, are proposed in a series of recommendations from representative psychiatrists and other physicians and announced by the National Committee for Mental Hygiene.

Even if no more than 50,000 to 150,000 of the men discharged from the Army and Navy or rejected by Selective Service for psychiatric disabilities turned to psychiatrists for help, it would be impossible to care for them with present resources. The number of these men needing such care is estimated at more than 2,000,000.

Following a conference of 30 physicians and community workers, at which Army, Navy, Public Health Service and Veterans Administration officers were present, a five-man committee drew up recommendations briefly as follows:

1. More psychiatric training of medical officers in the Army and Navy where such training in short courses has already proved highly successful.
2. An impartial restudy of treatment facilities and policies of the Veterans Administration and of legislation regarding compensation for veterans with psychoneurotic reactions. Compensation has a direct bearing on treatment in such cases, it is pointed out.
3. For emergency action, development in military installations of more facilities other than hospital care for treating men with psychoneurotic reactions. The hope is that by such means, including mental hygiene units, many more men can be retained in service for treatment which is not now available in civilian life.
4. Intensified effort by the National Committee for Mental Hygiene to arouse and inform the public on the needs of veterans with psychoneurotic reactions, the NP cases.
5. Prompt setting up of courses for general practitioners on emotional disorders, technically called neuroses, and their care.
6. For the long-range problem, various procedures for increased training of physicians and medical students in the psychiatric aspects of medicine and of psychiatrists in the treatment of patients who are not in mental hospitals and in the use of auxiliary personnel and community services.

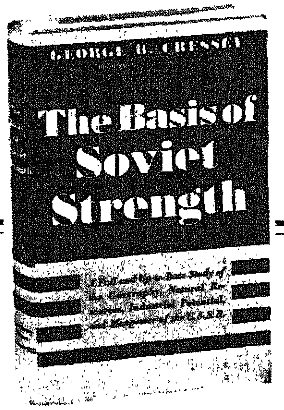
The demand for psychiatric care is likely to increase rather than grow less and to be particularly pressing if unemployment becomes widespread, in the opinion of physicians attending the conference.

The committee which drew up recommendations based on the conference discussion was made up of Dr. David P. Barr, Cornell University Medical College; Dr. Walter L. Palmer, University of Chicago School of Medicine; Dr. Thomas A. C. Rennie, Cornell University Medical College; Dr. George S. Stevenson, the National Committee for Mental Hygiene; and Dr. George W. Thorn, Harvard Medical School.

Science News Letter, August 4, 1945

Annual *"ham-and-egg" shows* are held in several Southern states where Negro farmers exhibit home-cured hams and newly laid and preserved eggs; the idea originated with a Negro agricultural extension worker 30 years ago.

American *mountain lion,* known also as cougar, panther, puma and catamount, is one of the largest predatory animals of the United States and kills annually many deer, calves, colts, lambs and young goats.



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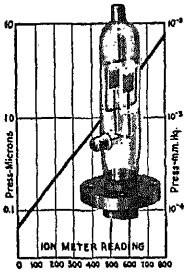

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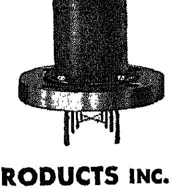

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• Books of the Week •

ADULT ADJUSTMENT: A Manual on the Coordination of Existing Community Services and the Establishment and Operation of Community Adjustment Centers for Veterans and Others—Morse A. Cartwright and Glen Burch—*Inst. of Adult Education,* 84 p., illus., $1.50.

AMERICAN GEOPHYSICAL UNION TRANSACTIONS OF 1944: Part V. Section of Hydrology Reports, Twenty-fifth Annual Meeting—*National Research Council,* 157 p., illus., paper, $1.50.

AMERICAN GEOPHYSICAL UNION TRANSACTIONS OF 1944: Part VI. Section of Hydrology Papers, Twenty-fifth Annual Meeting—*National Research Council,* 233 p., illus., paper, $2.

CAST IRON IN THE CHEMICAL AND PROCESS INDUSTRIES—F. L. La Que—*Gray Iron Founders' Soc.,* 27 p., paper, $1. Information on the properties and applications of gray cast iron.

DEVELOPMENTAL PSYCHOLOGY, An Introduction to the Study of Human Behavior—Florence L. Goodenough—*Appleton,* 723 p., illus., $3.75. 2nd ed., revised and enlarged.

HOW TO CASH IN ON YOUR DISCHARGE BENEFITS—Max D. Novack—*Wise,* 97 p., paper, illus., $1. The legal rights of the returning serviceman.

A MANUAL OF THE ASPERGILLI—Charles Thom and Kenneth B. Raper—*Williams & Wilkins,* 373 p., illus., $7. For the laboratory worker.

THE MAYA OF EAST CENTRAL QUINTANA ROO—Alfonso Villa R.—*Carnegie Institution of Washington,* 182 p., paper, illus., $2.25. Publication 559. Cloth binding, $2.75. A description of the mode of life of the descendants of the Maya Indians who made no peace with the Whites.

NEW CROPS FOR THE NEW WORLD—Charles Morrow Wilson, ed.—*Macmillan,* 295 p., illus., $3.50. The progress of inter-American agriculture.

PIONEER SETTLEMENT IN THE ASIATIC TROPICS: Studies in Land Utilization and Agricultural Colonization in Southeastern Asia—Karl J. Pelzer—*Am. Geographical Soc.,* 290 p., illus., $5. This study has been made with the cooperation of the Secretariat of the Institute of Pacific Relations. International Research Series.

SECRETS OF INDUSTRY—Lewis C. Ord—*Emerson,* 255 p., $3. An analysis of the requirements and techniques of industrial efficiency.

STUDIES IN BIOPHYSICS: The Critical Temperature of Serum (56°)—Lecomte Du Noüy—*Reinhold,* 185 p., illus., $3.50.

TALKING WAX, or the Story of the Phonograph—Leroy Hughbanks—*Hobson,* 142 p., illus., $1.50. Written in non-technical language for general readers.

YOUTH AND YOUR COMMUNITY—Alice C. Weitz—*Public Affairs Committee,* 31 p., paper, 10 cents. Prepared in cooperation with the Youth Conservation Committee of the General Federation of Women's Clubs. Public Affairs Pamphlet No. 108.

Science News Letter, August 4, 1945

MEDICINE

Cigarette Habit Doesn't Depend on Nicotine

➤ NICOTINE is a major factor in the cigarette habit of many persons, but for many other persons it is not. So conclude Drs. J. K. Finnegan, P. S. Larson and H. B. Haag, of the Medical College of Virginia, on the basis of a study reported in *Science* (July 27).

"Even in those in whom nicotine has become a major factor, we feel that a cigarette containing no nicotine would be grudgingly accepted as better than no cigarette at all," they state.

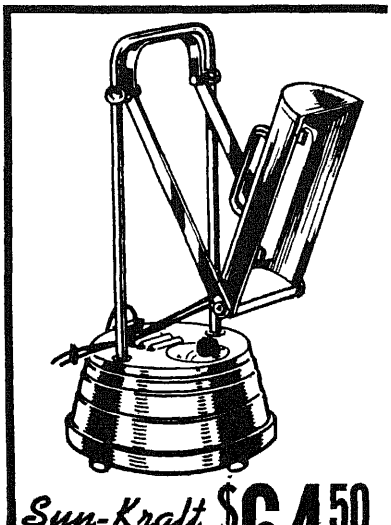
The degree to which nicotine is a factor is apparently not related to the number of cigarettes smoked daily. A man who for many years has smoked three packages daily changed to low-nicotine cigarettes without the slightest difficulty.

The study was made with 24 habitual smokers, all inhalers.

After a month of recording the number of cigarettes smoked daily when the subjects smoked their accustomed brands, each was given at least two cartons of specially prepared cigarettes to which nicotine had been added, followed by at least four cartons of low-nicotine cigarettes and then by two cartons of the ones containing added nicotine. The cigarettes were all made from tobacco naturally low in nicotine content. When the nicotine was added to these for the experiment, smoke from them assayed at almost six times as much nicotine as smoke from the cigarettes without added nicotine.

Of the 24 smokers, six "experienced no change in their physical or mental tranquility" while on the low-nicotine cigarettes. A vague initial lack in the satisfaction usually derived from smoking was felt by six. Three definitely missed the nicotine but got used to the change in one to two weeks. The other nine definitely missed the nicotine throughout the experimental period. They were more irritable, had trouble concentrating on mental tasks and felt an "inner hunger or emptiness."

Science News Letter, August 4, 1945



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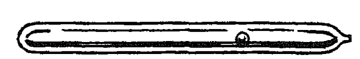
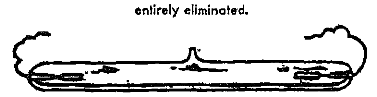


Sun-Kraft, "No filament, burn-out-proof" super transparent quartz tube can not burn out, can not fog, develop black spots or weaken in ultraviolet radiation. Costly replacements are entirely eliminated.



Conventional type electrode or filament activated tube. Deteriorates quickly because of the fused in metal. It will develop black spots fast, reducing ultraviolet radiation and eventually burning out entirely, necessitating costly replacements.

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PORTABLE ice cream machine, easily transported by truck, is used by the Army in the tropics to refresh men in combat areas. About six and a half feet long and less than half as wide, it can turn out two and a half gallon batches every 10 minutes or so, made from a dehydrated mixture to which water is added, then whipped and semi-frozen.

Science News Letter, August 4, 1945

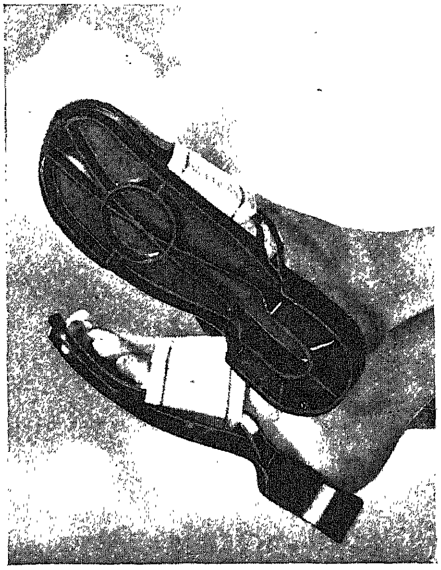
REPRODUCER of letters, maps and engineering and architectural drawings is a new machine that will print and dry-develop as much as 30 feet of material a minute, producing positive prints. The material is sensitized with special azo dyes; ammonia vapor is the developing agent. No washing, fixing or drying is necessary.

Science News Letter, August 4, 1945

CLAMPS for clothesline poles keep the prop from slipping and falling when the wash on the line swings with the wind. The pole has a deep notch on its end to engage the line. A pivoted flat piece of material with a notch on its side and attached to the side of the pole holds the rope firmly when swung into place.

Science News Letter, August 4, 1945

PLASTIC CLOGS for locker room and shower wear, have soles, heels and arches molded to the shape of the foot. An adjustable textile band over the instep holds the sandal in place, and molded ridges around the edge and under the center of the sole, shown in the picture, prevent slipping on wet floors.



Science News Letter, August 4, 1945

PLIERS, to grip an object and lock in gripping position, resemble an ordinary pair of pliers but have a hinged latch-arm normally inside one handle which, when released by pressure of the thumb on a spring, swings across between the two handles. Triangular teeth on the latch-arm engage a [illegible] the opposite handle.

Science News Letter, August 4, 1945

SUPPORTING device for a camera, by which it can be held in place on the side of a post or a tree, is an arm with a screw end for inserting into the wood. The other end, with a ball joint, grasps the camera, the position of which can be adjusted by use of a thumb-screw.

Science News Letter, August 4, 1945

CEILING board prop, to hold ceiling covering in position while being attached in place, is a telescoping rod with an extended base and two hinged arms at the top which open out to support the ceiling board. By means of a handle on the side, the board is elevated into place and held by ratchets inside the prop.

Science News Letter, August 4, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 270.*

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Fugitive Beauty
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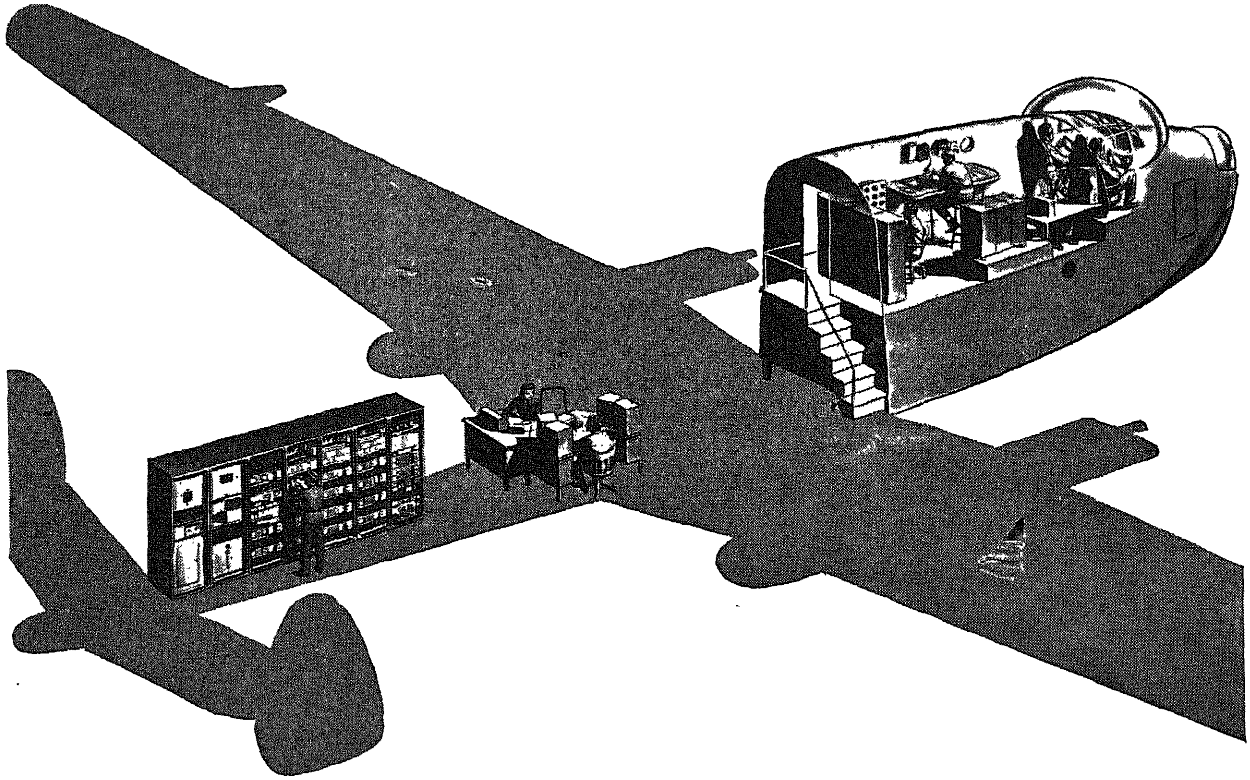
A SCIENCE SERVICE PUBLICATION

THIS SEA-GULL LIVES ON THE GROUND



This is a "flight trainer"— an electronically operated replica of the PBM-3 flying boat. It was conceived by the Bureau of Aeronautics and developed by Bell Laboratories to train Navy crews on the ground.

The new crew climb a few steps to get in and from then on it is like being in a big plane at night. Controls tug against the pilot's grasp and "engines" roar in response to the throttle. From his desk, the instructor creates every situation of real flight — even to iced-up wings, conked-out engines and sudden air-pockets. Pilot and crew get the feel of danger without the hazard.

Once the control dials are set, the various effects are automatically organized and set in motion by concealed machinery which includes 200 vacuum tubes, 60 motors, loudspeakers and hundreds of associated parts. Twenty Laboratories engineers worked more than a year developing the project. Drawings covered an area equal to 15,000 square feet.

This is only one of the 1200 projects in which our experience has been able to help the Armed Forces. What we have learned in devising electronic circuits to train flyers will help build better telephones.

BELL TELEPHONE LABORATORIES

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AERONAUTICS

Fastest Fighter

The jet-propelled P-80, a low-wing, all-metal, single-place craft, has a speed of over 550 miles an hour. Its service ceiling is 45,000 feet.

➤ THE NEW jet-propelled combat plane, the P-80 Shooting Star, has a speed of over 550 miles an hour and is probably the fastest fighter in existence. Performance data and other information relative to this new craft were released by Gen. H. H. Arnold, commanding general of the Army Air Forces. It has a service ceiling of more than 45,000 feet, and armament of six .50-caliber machine guns.

The P-80 is a low-wing, all-metal single-plane craft intended for interception and attack of enemy planes at high altitudes. It has an interchangeable nose constructed for photographic equipment, so can also serve for high-speed photo reconnaissance.

The plane is one of the "cleanest" aerodynamic aircraft in existence. Air scoops and the bubble-type free-flow canopy are the only protuberances on the fuselage, which actually is round in shape but appears oval when viewed head-on. The wing tapers both at leading and trailing edges. The canopy is mounted well forward of the wing to give improved visibility for the pilot. An armor-glass windshield and steel armor plate afford the pilot protection.

Each wingtip is equipped with shackles for bombs or droppable fuel tanks. The nose section, aside from armament or photographic equipment, contains compartments for oxygen and radio equipment. The mid-section houses the cockpit in the forward structure, a fuel tank compartment in the center, and the power plant at the after end. The after section supporting the tail group is joined to the mid-section with detachable fittings to facilitate power-plant removal. A complete engine change can be made in 20 minutes.

Designed and developed in cooperation with Army engineers, the new jet-fighter is produced by the Lockheed Air Corporation. Its gas turbine engine is built by General Electric and by the Allison Division of General Motors. The engine is larger and greatly improved over others previously used, but is a light, compact unit, considering its power output.

The P-80 has a wing-span of 39 feet and is only 11 feet 4 inches high from the ground to the tip of the rudder. It is 34 feet 6 inches in length; its empty weight is approximately 8,000 pounds. Carrying a maximum fuel load for long-range operation, its weight is 14,000 pounds.

Magnesium rather than aluminum is used for engine castings, saving 100 pounds of weight. The first P-80 engines were designed to operate on kerosene, but now, with modification of the fuel system, can operate on gasoline of any octane rating.

Science News Letter, August 11, 1945

AERONAUTICS-VOLCANOLOGY

Helicopter Performs Well Over Mexican Volcano

➤ EVEN at two miles above sea level the Army's Sikorsky helicopter, although built for lower altitude operation, will fly successfully and do jobs in war and peace that conventional airplanes cannot do.

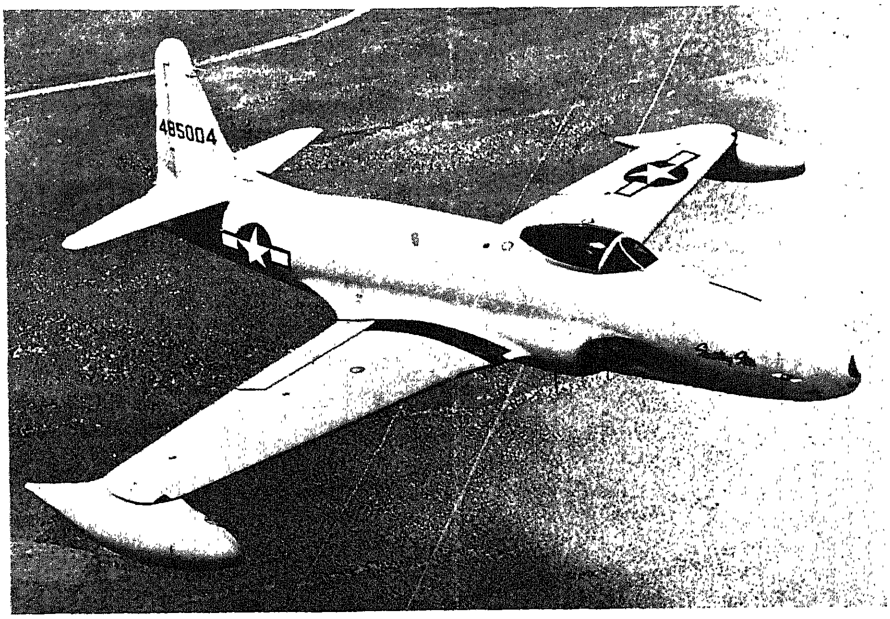
This has been proved by two weeks of helicopter flights at the Mexican volcano, Paricutin, in an expedition of the Army's Air Technical Service Command of Wright Field, Dayton, Ohio, and the U. S.-Mexican Volcano Commission.

Several dozen flights have been made carrying scientists of Mexico and the United States aloft for leisurely views of the new volcano that after 2½ years is still in active eruption.

Igor Sikorsky, pioneer aviation engineer and designer of the helicopter used, joined the the expedition at the volcano for several days and made several hops in his helicopter as a passenger. The performance of the volcano interested him almost as much as the way the helicopter behaved. Last year he visited Paricutin and had a ground view of its splendor by night and by day. On this trip he lived at the helicopter camp near the lava-destroyed village of San Juan Parangaricutiro, and was able to take to the air when it was desired to observe the changing moods of the natural monster.

Just how the helicopter would act at the 7,200 foot altitude of the volcano's base or the 10,000 foot altitude necessary to fly above it was an unanswered question before the expedition. Now Mr. Sikorsky and the Army's helicopter experts are sure that the helicopter can perform military missions at high altitudes as it has at lower altitudes.

Science News Letter, August 11, 1945



JET FIGHTER—Shown in flight is the U. S. Army Air Forces' new P-80 Shooting Star. The plane is powered by a new jet propulsion gas turbine engine and is capable of speeds in excess of 550 miles per hour. The service ceiling is above 40,000 feet.

AVIATION MEDICINE

German Research Used

Among developments surrendered by Nazis is catapult seat for bailing out of planes at high speed. Will save lives of American flyers in Pacific.

➤ RESEARCH by German scientists will soon be saving the lives of American flyers fighting in the Pacific. Col. W. Randolph Lovelace, who has recently returned from Germany where he accepted the surrender of precious results of painstaking and valuable scientific investigations, said that he expects some of the German developments to be of great value to us. Col. Lovelace is Chief of the Aero Medical Laboratory at Wright Field, Ohio.

Perhaps the most important of those that can be made public is a catapult seat for airplane pilots which will make it possible for the pilot to bale out of a plane flying at a speed of over 500 miles an hour and out of control. At the will of the pilot, this seat will automatically toss him, seat and all, 15 or 20 feet into the air above the plane and clear of it. It is the only safe way, Col. Lovelace said, to get out of a plane going at that speed, and there are circumstances in combat when it is not possible for the pilot to reduce the speed of his plane before jumping. The seat will work at an altitude of 30,000 feet, and it is good at low altitudes, too.

The Germans, Col. Lovelace found, realized fully the importance of basic research and kept it up even under great difficulties of bombing and having to move from place to place as our forces and those of our allies swept over Germany. They also kept up the training of men for scientific research; enrollments in technical schools were still high up until last summer.

Col. Lovelace found the German scientists quite willing to cooperate with their American captors. They had been ordered to burn all documents and research papers of a secret or confidential nature. But in many cases this was not done. Instead, the Germans carefully filed their documents in metal boxes which were welded shut and then buried. These were cheerfully dug up at the request of the Americans. All reports were made out in careful detail and research was of an excellent quality. It will save us years of time as well as lives. In other cases, the documents were burned as ordered, but previously were all microfilmed to preserve the scientific labor involved.

In addition to turning over reports already completed, the scientists offered to make drawings showing their developments, make parts if required, or even outline plans for future research.

Other research of importance to us was the work on optics—optical testing and experimental equipment, equipment for grinding special glasses, and telescopes, which was conducted at the Zeiss laboratories. A novel and useful instrument was one for measuring the illumination of the night sky.

They have done wind tunnel research on the ability of men to withstand a wind of as high as 530 miles per hour. We have done wind tunnel research on human subjects, but only went up as high as 180 to 200 miles per hour. The German medical scientists acted as their own subjects for this research.

In only one investigation was it found that the German flight surgeons used prisoners for their medical research. That was in a study of the effects of being in cold water or very cold environment. In six cases this research was carried up to the point of death. Death would occur, Col. Lovelace said, in water of about freezing temperature with a high wind after only about 30 minutes exposure. The prisoners used were both military and political prisoners, but did not include any Americans.

In most fields it was found that American research is better than the German research was. Outstanding of our own developments in use over Germany is the 2½ pound G-suit. This light suit helps to prevent or delay "blackout" of flyers in the fast loops and turns of combat by automatically applying support to the abdomen and legs. It had a great deal to do with the ability of American flyers to shoot down the Germans' fast ME-262 plane in combat against our P-51. The Germans were preparing to copy our suit when the war ended.

The Germans also credited our flyers who were captured by them with knowing more about the physiology of how the human body acts during flight than was known to some of the German flight surgeons. Col. Lovelace attributed this to a book which presents scientific findings about flight in an interesting and humorous way with a liberal use of cartoons, "Your Body in Flight."

Science News Letter, August 11, 1945

Animal hoofs and horns do not yield *glue,* but the piths of the horns are good sources of raw material for this widely used material.

Digger pine, or gray pine, found only in California, bears rich nutlike seeds, on which Indians once subsisted during a part of each year.

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ENTOMOLOGY

Mosquito Larvae Die

The wigglers get cramps and drown when their breeding pond is treated with DDT. Scientist who made this discovery was killed on Okinawa in June.

➤ WHEN mosquito breeding ponds are treated with DDT, the wigglers or larvae get cramps and, like many human swimmers similarly afflicted, drown.

The discovery of this effect of DDT on the larvae of malaria mosquitoes was made by John D. Maple, formerly of the Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture. Mr. Maple was killed while fighting mosquitoes on Okinawa last June.

The symptoms of DDT poisoning of the wigglers of malaria mosquitoes, he reported, are "excessive swimming along the water surfaces and occasional tremors, followed by sinking."

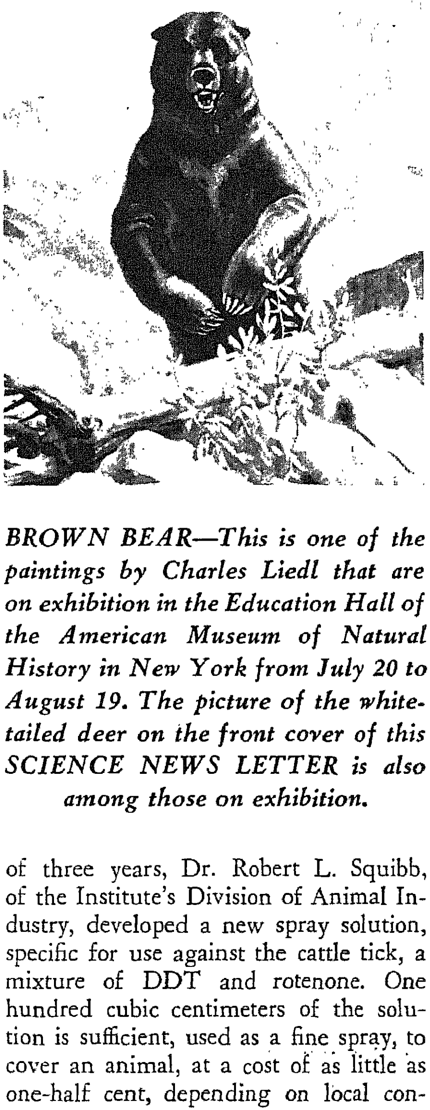
Whether or not the wiggler gets enough DDT poison to kill it outright, it sinks and tries to struggle back to the surface for air but is not able to make it, and so drowns.

The discovery of how the wigglers die when ponds are treated with DDT explains why this potent insecticide gets quicker action against the wigglers than against adult mosquitoes.

Although the best mosquito killer ever discovered, DDT is not the fastest. In Department of Agriculture studies, microscopic crystals of DDT have been fed to individual mosquitoes. Many of the insects lived for hours, but died in a day or less. Death was sometimes slow but always sure.

From the standpoint of mosquito killing, the cause of death is immaterial; the wiggler that drowns will never be able to carry malaria germs. From the standpoint of control of malaria, yellow fever, dengue, filiarasis and some other diseases, the delay in the action of DDT may, or may not, prove of importance. DDT is still so new that scientists have not been able to make the careful studies required to enable them to say whether a poisoned adult mosquito can attack and infect a person after it has been poisoned but before the poison takes effect. Research programs are working full speed ahead to answer as many as possible of such questions both to improve the immediate protection DDT is giving to the armed forces, and to prepare the way for safe use of DDT by civilians.

Science News Letter, August 11, 1945



BROWN BEAR—This is one of the paintings by Charles Liedl that are on exhibition in the Education Hall of the American Museum of Natural History in New York from July 20 to August 19. The picture of the white-tailed deer on the front cover of this SCIENCE NEWS LETTER is also among those on exhibition.

ENTOMOLOGY

Cattle Ticks Controlled

DDT-rotenone spray checks the pests in the tropics. Length of effectiveness of treatment varies with the climatic conditions.

➤ SPRAYING with DDT and rotenone mixture provides a practical and economical solution of one of the major problems of cattle raisers in tropical and sub-tropical regions, control of cattle ticks, it was announced at the Third Inter-American Agricultural Conference by Dr. Earl N. Bressman, Director of the Interamerican Institute of Agricultural Sciences at Turrialba, Costa Rica. It is expected that the new method will be applicable from the northern provinces of Argentina to the southern United States.

Cattle-dipping vats, which have been widely successful in tick control in temperate regions, have had considerably less success in the tropics, for a variety of reasons. Over large areas the necessity of depending on relatively untrained personnel resulted in high mortalities because of poorly designed dipping vats, arsenic poisoning of cattle, mechanical abortion, and other injuries. Furthermore, the intense tropical heat often caused deaths from overheating, especially in the case of animals that had to be driven long distances to the vats—which often cost in the neighborhood of $4,000 each—and the cattle suffered from decreased milk production and, in the case of the ubiquitous oxen, from lack of rest following dipping.

After 110 experiments over a period of three years, Dr. Robert L. Squibb, of the Institute's Division of Animal Industry, developed a new spray solution, specific for use against the cattle tick, a mixture of DDT and rotenone. One hundred cubic centimeters of the solution is sufficient, used as a fine spray, to cover an animal, at a cost of as little as one-half cent, depending on local conditions. A wide variety of spraying equipment, ranging from a hand-operated flit gun to power equipment, secures equally effective results. A tick mortality of 95% has been recorded from animals with an infestation of as high as 40 ticks per square inch.

Length of effectiveness of the treatment varies with climatic conditions, as does cattle dipping, and the solution has continued to give protection against the ticks up to 80 days. Spraying between the animals' legs and in body crevices is not necessary since once engorged ticks have dropped off, the animal is not reinfested during the period of spray effectiveness. More than 7,000 applications have been given over a period of nine months, with no indication of a poisonous tendency.

Science News Letter, August 11, 1945

CHEMISTRY

Sulfuric Acid's Future

Now producing at a rate of 10,000,000 tons a year, it does not face as severe a cut-back after the war as many other industries do.

➤ THE SULFURIC acid industry of the United States, now producing at a rate of over 10,000,000 tons a year, does not face as severe a cut-back in production after the war as many other industries because much of the acid used in the production of war essentials is not consumed in the process and is recovered and remarketed, being suitable for use in other industries. In postwar days it will go directly to these present secondary users.

"Of the sulfuric acid value supplied the TNT manufacturer, approximately 95% is returned to the market as a recovered spent acid," states Alonzo White III, of the War Production Board, in *Chemical and Engineering News* (July), "and may be used to fulfill requirements in the steel, petroleum, heavy chemical, and superphosphate fertilizer industries." The publication is an official organ of the American Chemical Society.

Sulfuric acid, he points out, is not a one-purpose product. It finds applications as a dehydrating agent, catalyst, active reactant in chemical processes, solvent and absorbent. Acids produced are of different strengths and degrees of purity. Sulfuric acid is produced by several different processes. The user must select the acid with the specifications required for his particular use.

Aviation fuel production requires large quantities of sulfuric acid for its alkylation process which results in an "alkylation spent" acid. This, Mr. White says, may be hydrolyzed to remove hydrocarbons present, or processed "as is" in a sulfuric acid decomposition unit and converted to clean acid. The recovery may range as high as 90% of the acidity value supplied, depending on the equipment available and the method of handling at the refinery.

Smokeless powder production also uses large quantities of sulfuric acid in the manufacture of the nitrocellulose for the powder. Recovery of the acid from this process is not as great as in the manufacture of TNT. In making nitrocellulose for smokeless powder, there is a loss, he states, of about half a pound of the acid for each pound of the nitrocellulose produced.

"Indications are," Mr. White concludes, "that there will be a gradual conversion of some industries to peacetime activities from now until VJ Day, at which time extensive changes are anticipated. Some of the conversions will result in slight increases in sulfuric acid usage."

Steel will consume more for pickling purposes, and the superphosphate fertilizer industry is capable of consumption of considerably more acid than is now being consumed.

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ASTRONOMY

Very Red Stars Are Easily Detected

➤ VERY RED STARS whose spectra show an abundance of titanium oxide and carbon compounds show a special distribution in our part of the galaxy, report Dr. Oliver J. Lee, director, and Thomas J. Bartlett of the Dearborn Observatory of Northwestern University.

The titanium oxide stars, known to astronomers as types M5 to M8, are more easily detected and classified on plates made at the observatory than any other stars, so if others had been present in the regions studied, they undoubtedly would have been identified during the Dearborn survey of faint red stars.

The second of three parts of the survey has just been announced in the Annals of Dearborn Observatory. So far nearly one-third of the total area of the sky, or about 14,000 square degrees, has been studied.

M-type dwarf stars of absolute magnitude 9.7, which means stars only about 1/100 as bright as the sun, have been observed to a distance of about 123 light years, or 722,000,000,000,000 miles away. Ordinary giants and supergiants located hundred of times farther away were also studied. Thus these giants have been hunted far and wide, and if they are well distributed in our galaxy, considerable numbers should have been recorded on the photographic plates as faint stars.

Among the 22,680 stars which have been catalogued thus far at the observatory only 1,499 were of the advanced titanium oxide type.

Because of the foregoing considerations, and because of the relatively high concentration of carbon stars in the anticentric regions of the Milky Way, several questions which would bear further investigation have occurred to the Dearborn astronomers:

Does our branch of the Milky Way have an unusually abundant supply of carbon and its compounds? Is this true also of the titanium oxide molecule in stars of advanced M type?

If so, is this due to quite irregular distribution of those cosmic materials or does our part of galactic space have properties which tend to make them more favorable materials for building stars?

Is our branch of our galaxy a somewhat recently developed subdivision, or possibly a very old one, in which a carbon cycle and perhaps a titanium cycle have gone berserk and rule the destinies of stars for a brief period with complete abandon?

Science News Letter, August 11, 1945

PUBLIC HEALTH

Polio Cases Are Less Than This Time Last Year

➤ ALTHOUGH the number of infantile paralysis cases reported to the U. S. Public Health Service is still increasing, fewer cases have been reported for each of the last six weeks than for the corresponding period last year. This would seem to indicate that the number of cases throughout the country may not reach epidemic proportions.

A total of 963 more cases were reported last year than this year for the six weeks from June 16 to July 28. Up to June 7, more cases were reported for this year than last. There will probably continue to be an increase in the number of cases reported until September, but the increase is expected to be slight in comparison with those of last year. To date this year, 2,048 cases have been reported for the country as a whole as compared with 3,060 for the same period last year.

For the week ending July 28, 391 cases were reported for the country as a whole, compared with 369 for the preceding week. This increase of only 22 cases compares most favorably with an increase of 172 for the same week last year. In New York state 72 cases were reported for the week ending July 28, 25 of these being for New York City alone.

Science News Letter, August 11, 1945

DENTISTRY

May Replace Dentist's Drill

New device operates on sand-blast principle and cuts tooth enamel and dentin swiftly and painlessly. Is called "airbrasive".

➤ GOOD NEWS for those who dread the dentist's drill appears in the *Journal of the American Dental Association* (Aug.).

The drill may be replaced by a new device which cuts tooth enamel and dentin swiftly and without pain or noise. It was developed by Dr. Robert B. Black, of Corpus Christi, Texas.

"Airbrasive" is the name Dr. Black coined for the new instrument. It operates somewhat on the principle of a sand-blast, but does not use sand and does not use a diffuse or blast type of airstream.

Instead of sand, aluminum oxide is used as the abrasive. Other substances might be used, but Dr. Black believes this is most nearly ideal for dental work. A softer abrasive, such as pumice, might be used for removing stains in cleaning teeth. Boron dioxide, a relatively new abrasive and the hardest of all man-made materials, rivalling the diamond in abrasive properties, might also be used.

The abrasive is applied with a very fine, almost pinpoint stream of compressed air. This gives precise control over the cutting action. A secondary stream of air leads the used abrasive and tooth debris into a vacuum hood on the instrument.

No pressure is exerted against the tooth, as is done with the dentist's drill. Consequently the patient is relieved of this discomfort and the fear of the dentist's hand slipping. The dentist is also relieved of considerable tension and fatigue. The airbrasive instrument, although capable of cutting hard structures, has practically no effect on soft ones, so there is no danger to gums, cheeks, tongue or the dentist's fingers if the stream does accidentally strike any of these.

Vibration and hêat, both uncomfortable accompaniments of the usual drilling to prepare a cavity for filling, are not present with the airbrasive instrument. The unpleasant hum or grinding sound is also banished. The only sound to be heard is the slight hiss of the airstream.

Besides these advantages, the airbrasive instrument is fast. One patient had to be given a hand mirror to convince her that anything had been done, the cavity preparation was accomplished so swiftly.

She was a typical nervous patient with teeth more sensitive than usual, Dr. Black had found when he previously filled eight cavities in her teeth, using the dental bur.

The first cavity he prepared with the airbrasive was on the upper left first bicuspid. (This is the fourth tooth from the center.) The cavity extended well into the dentin and when completed included about half the area of the surface of the tooth on the tongue side. It took about four minutes to complete the preparation with the airbrasive instrument. The patient was "enthusiastic" about the complete lack of any disagreeable sensation.

The airbrasive instrument will, Dr. Black believes, be ideal for eliminating deep grooves and pits on children's teeth, conditions that might become decayed spots or cavities. It has not as yet been used for this purpose, however.

Further research, investigation and development are warranted, Dr. Black believes, in order to extend to the fullest the possibilities of this new instrument.

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AERONAUTICS

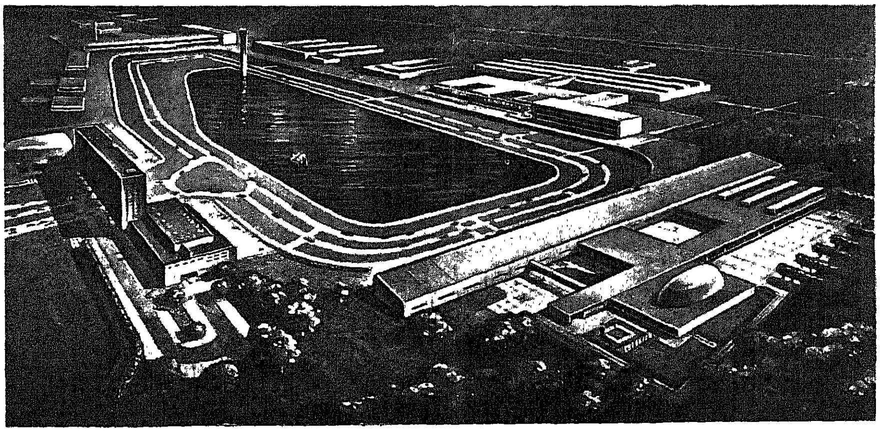
Single-Seater Combats High-Flying Raiders

➤ DETAILS are now revealed on the British Westland Welkin stratosphere single-seater fighter, designed to combat high-flying raiders. It is one of the highest flying of combat planes, the largest English single-seater fighter, and has an armored pressure cabin and is equipped with four cannon.

The Welkin has a wing-span of 70 feet, is over 41 feet in length, and nearly 16 feet high. Its weight is 17,500 pounds. It is powered by two Rolls-Royce Merlin engines, each of which develops 1,650 horsepower, and by means of a two-stage two-speed supercharger maintains great power at height.

The plane is capable of 385 miles an hour, and has a range of about 1,500 miles. Extreme low temperatures are offset by a sandwich construction in which warm air is pumped between the double layers of glazing forming the pressure-resisting surface of the coupe. This heating device is light, but it keeps the cockpit so warm that special clothing is not needed even when the outside temperature is 78 degrees below zero Fahrenheit.

Science News Letter, August 11, 1945



GENERAL MOTORS CENTER—This view of the new General Motors Technical Center, which is to be built just outside the automobile center of Detroit, shows the layout of buildings and connecting roadways around the central esplanade. The central lake will supply water for cooling as well as lending beauty. At lower left is the Administration building and at lower right the new Styling building. Immediately above the latter is the Advanced Engineering building. To its left and just to the right of the water tower is the Process Development building. At the extreme end is the Research Laboratories building. Other buildings shown in the drawing represent potential expansion.

CHEMISTRY

Colored Chemical Smokes Help in Identifying Japs

➤ DEAD MEN may still tell tales, in mopping-up operations on islands wrested from Japanese control. They do it through rainbow-colored stains on their clothing or skins, the Army's Chemical Warfare Service has disclosed.

It is a new application of the grenade-like "candles" that pour out great volumes of bright-hued smoke, originally devised for the identification of tanks or troops in the open to friendly airplanes overhead, and for other signalling purposes. The smokes come in the six principal rainbow colors, from red to violet, as well as in white and black.

When an American mopping-up patrol locates a cave system full of hold-out Japs, they heave in some smoke candles of an agreed-on color. The next cave complex will be smoked with another color. Later, when the Japs are killed or captured in the open, the tinge of the smoke still clinging to them will tell where they came from.

Although these colored smokes are non-poisonous, the Japs seem to be very much afraid of them.

Science News Letter, August 11, 1945

GENERAL SCIENCE

Latin-American Scientists Get U. S. Fellowships

➤ SCIENTISTS of Argentina, Brazil, Chile, Cuba, Mexico and Uruguay are represented among those awarded Latin American Fellowships of the Simon Guggenheim Memorial Foundation for advanced study in the United States.

The fellowship carries with it a stipend which is usually $2,000 for the year plus traveling expenses to the United States and return.

The following are some of those given fellowships:

Mathematics and astronomy: Prof. Rafael Laguardia, director of the Institute of Mathematics and Engineering, University of Montevideo, Uruguay. Dr. Carlos Ulrrico Cesco, University of La Plata, Argentina. Guido Munch, National Observatory of Mexico. Félix Cernuschi, University of Tucuman, Argentina.

Medicine: Dr. José Jesús Estable, Sub-Director of the Institute for Experimental Medicine, Montevideo, Uruguay. Dr. Alfonso Graña, Institute for Experimental Medicine, Montevideo, Uruguay. Dr. Eduardo Aguirre Pequeño, director, Institute of Scientific Research, University of Nuevo León, Monterrey, Mexico.

Biology: Dr. Manuel Maldonado Koerdell, chairman of the Section of Natural History, Institute of Scientific Research, University of Nuevo León, Monterrey, Mexico. Bernardo Villa Ramírez, National University of Mexico. Dr. Elisa Hirschhorn, plant pathologist, La Plata, Argentina. Sigurd Arentsen, Chilean Department of Agriculture, Santiago, Chile. Dr. Luis René Rivas y Díaz, Museum of Natural History, La Salle College, Havana, Cuba.

Other fellowships were awarded in such fields as history, geography, linguistics, agrarian policy and art.

Science News Letter, August 11, 1945

CHEMISTRY

Building Up Molecules Makes New Substances

➤ CHEMISTS are learning how to make new desirable substances by building up the kind of molecules desired, declared Dr. George R. Harrison, dean of science at the Massachusetts Institute of Technology. Only a few tens of thousands of different kinds of molecules have been identified as occurring in nature; now nearly a million new kinds of molecules have been produced, he stated.

"Scientists have long known," he said, "that the best way to understand a material is to understand the molecules of which it is composed." In earlier days, he added, "chemists produced new substances by mixing chemicals together, letting them fizz more or less at random, and then seeing whether the new substance obtained had properties which would be useful. Today, however, they are learning to figure out in advance how to build molecules which will have any desired property."

The spectroscope is the instrument that has enabled chemists to find out how atoms fit together to make molecules, Dr. Harrison stated, adding: "This device has unlocked even more secrets of nature than have its companions, the telescope and the microscope."

"The spectroscope is a very simple instrument," he explained, "but it gives the answers to an incredible variety of scientific questions, from the size of an atom to the weight of a star, merely by dissecting a beam of light from the star or atom and measuring its component colors or wavelengths."

Dr. Harrison spoke during a broadcast program of the New York Philharmonic Orchestra, sponsored by the United States Rubber Company.

Science News Letter, August 11, 1945

IN SCIEN

BIOCHEMISTRY

Sulfa Drugs More Effective When Used With Dyes

➤ SULFA drugs can be made effective against species of bacteria that ordinarily resist their action by using them in combination with certain synthetic dyes, Prof. F. S. Thatcher of McGill University at Quebec has discovered. The dyes found most effective in this way are known as methylene blue and brilliant cresyl blue. Both these dyes are themselves able to check the growth of bacteria, but when used in combination with one of the sulfa drugs the concentration of both dye and sulfa compound is much lower than when either is used alone.

Prof. Thatcher's results were obtained entirely with laboratory-grown bacteria in glass vessels. However, in reporting his researches in *Science* (Aug. 3), he states that clinical studies undertaken in cooperation with Dr. J. T. MacLean at the Ste. Anne de Bellevue Military Hospital "indicate a promising therapeutical value" for a combination dye-and-sulfa treatment of at least one type of infection.

Science News Letter, August 11, 1945

OPTICS

Stainless Steel Filter Gives Brighter Photographs

➤ VERY THIN films of stainless steel, which have a degree of transparency, placed in front of the wide-angle lenses used in aerial photography, furnish the solution to a former difficult problem. Heretofore in using wide-angle lenses a "hot spot" in the center of the field of vision resulted in pictures bright in the middle but dark at the edges.

Scientists of the Bausch and Lomb Optical Company developed a vignetting filter consisting of a disk of optical glass on which a film of stainless steel was deposited by a special electro-vacuum precipitation process. Placed in front of the lens, the film is thickest and transmits least light at the center of the disk, becoming gradually thinner and more transparent toward the edge. By complementing the characteristics of the photographic lens with which it is used, the filter permits photographs of ordinary density distribution.

Science News Letter, August 11, 1945

E FIELDS

PUBLIC HEALTH

TB Death Rate Declines, Effects of War Come Later

➤ IN SPITE of the war, which might have caused an increase in tuberculosis, 3,000 fewer persons died of the disease in the United States in 1944 than in 1943. The death rate based on provisional figures was 40.8 per 100,000 population, compared with 42.6 per 100,000 in 1943. Only 12 states reported increases in 1944 over their 1943 rates, while in 1943 increases over the 1942 rate were reported by 23 states.

This "definitely encouraging" news, announced by the National Tuberculosis Association, is countered by a warning from Dr. Kendall Emerson, managing director of the association.

"Because of the long course of the disease the full effect of wartime conditions on tuberculosis control in this country may not be known for several years," he said.

Two major factors, according to Dr. Emerson, undoubtedly contributed to the continued decline of tuberculosis during war years. First, the American civilian population has not had to undergo dire wartime conditions, including severe malnutrition. Second, the recent expansion of mass X-ray surveys, particularly among industrial workers, conducted by health departments and tuberculosis associations, has discovered many new cases.

Discovering new cases, he explained, was a gain against the disease because many of them were diagnosed in the early, more easily curable stage. This means not only quicker recovery for the patient but less chance of others getting the disease from him.

Science News Letter, August 11, 1945

BIOLOGY

Oysters Can Be "Forced" By Warming in Winter

➤ OYSTERS can be induced to produce eggs in winter, just as greenhouse flowers can be brought to bloom out of season, simply by warming them up to the proper temperature, Dr. Victor L. Loosanoff of the U. S. Fish and Wildlife Service laboratory in Milford, Conn., has discovered. He announces his results in *Science* (Aug. 3).

Ordinarily, oysters begin the development of their reproductive glands in early autumn, then go into an inactive stage during the winter and begin producing eggs when the water warms up in spring. Sometimes, for research purposes, it is desirable to obtain oyster eggs out of season.

Dr. Loosanoff took sexually inactive oysters from outdoor tanks where the water was so cold that a scum of ice had formed on it, and brought them indoors. They were permitted to warm up gradually to room temperatures, then further warmed until the water in which they lay was as warm as in midsummer. The oysters responded by producing eggs, as well as sperm to fertilize them, and undergoing at least the early stages of development in apparently normal manner.

Science News Letter, August 11, 1945

MEDICINE

Protein Fraction Used In Treating Poisoning

➤ SEVERE poisoning from breathing the fumes of carbon tetrachloride, widely used but somewhat risky cleaning fluid, has been successfully treated with methionine, one of the amino acids, or building-blocks out of which proteins are formed, Dr. James H. Eddy, Jr., of Shreveport, La., states. (*Journal, American Medical Association,* Aug. 4).

The patients were all Negroes, employed in an ordnance plant near Shreveport where land-mine cases are produced. Cleaning up the hot metal cases, the workers swabbed them with rags saturated in carbon tetrachloride. The fumes sent most of them out of doors to get some fresh air, but then they went back to work and finished their shift. Not until after they had gone home did they become really ill.

Several of the victims of the gas were disabled for longer or shorter periods. They described their sensations as resembling those of alcoholic intoxication, followed by faintness, dizziness, abdominal pain, nausea and vomiting. Two patients, both women, died. Autopsy showed breakdown of the liver tissues as the principal damage.

Treatment of the non-fatal cases consisted mainly in carefully adjusted diet, plus frequent doses of methionine. While Dr. Eddy feels encouraged at the results of the methionine treatment, he adds a cautionary note that more clinical data are needed, and hopes that other physicians will report their experiences.

Science News Letter, August 11, 1945

ENGINEERING

Medal Awarded for Work On Jet Propulsion

➤ MEDALS in recognition of outstanding work in application of jet-propulsion, development of turbosuperchargers, and other important engineering problems will be awarded to four prominent engineers, it is announced by the American Society of Mechanical Engineers. Honorary membership in the Society will be received by a Chinese and an English engineer and by several Americans.

The American Society of Mechanical Engineers medal, the Society's highest honor, will go to William Frederick Durand, of the National Research Council, Washington, D. C., in recognition of his work, particularly in forwarding the design and application of the principles of jet propulsion, and his services to the government in engineering research.

The Holley medal will be given to Dr. Sanford Alexander Moss of the General Electric Co., Lynn, Mass., for his pioneer work in turbosuperchargers which largely made possible the high ceilings, speed and range of modern aircraft.

Dr. Joseph M. Juran, assistant to the administrator of the Foreign Economic Administration, Washington, D. C., will receive the Worcester Reed Warner medal for his contribution to engineering literature, including his contribution to the problem of quality control in mass production.

The Melville Prize medal will go to William Julian King of the Battelle Memorial Institute, Columbus, Ohio, for a paper on "The Unwritten Laws of Engineering." His work at the institute has been chiefly with the fundamentals of combustion in liquid fuels, and the development of gas engines.

In addition to these four, Bruce E. Del Mar, supercharging engineer of the Douglas Aircraft Company, Santa Monica, Calif., will receive the Junior Award for his work and a technical paper on centrifugal compressor performance.

Honorary membership in the society will be received by Wong Wen-hao of Chungking, China, and by Sir William Arthur Stanier of London, England. Rear Admiral Harold Gardiner Bowen, U.S.N., Dugal Caleb Jackson of the Massachusetts Institute of Technology, and Audrey Abraham Potter of Purdue University will also receive honorary memberships.

Science News Letter, August 11, 1945

ENGINEERING

Amputees Can Drive

Special devices will make it easy for disabled veterans to operate any make of car. Hand service brake control permits a man without legs to stop quickly.

By MARTHA G. MORROW

➤ MANY veterans who have lost an arm or leg are asking "Will I be able to drive a car?" They and their friends may be assured that if they really want to drive, they undoubtedly will be able to do so.

Men today who have lost both legs, an arm and a leg, or both arms, are passing the most exacting driving tests, having been taught to drive safely despite their handicaps. Some who had never driven before have painfully mastered the intricacies of driving and now hold driving licenses from their home states. Sure, they can drive, either their own car or a friend's!

The more seriously injured men, and those who want ease as well as safety in driving long distances, may look forward to owning a special set of controls which can be installed in any standard car. Already demonstrated at several Army hospitals, these devices which enable an amputee to drive with one foot, one hand or mechanical hooks, will probably be on the market within a few months.

12,500 Already Drive

Many of the 12,500 men who lost either arms and legs fighting in Italy, France, Germany and the Pacific areas have already demonstrated that they can drive standard automobiles without special aids, and do so as expertly as a good driver with both arms and both legs.

Early this year an instructor training course was given at Walter Reed General Hospital, Washington, D. C., by the American Automobile Association. Looking for those slight but all-important variations between the way an average person drives and the manner in which an amputee can drive best, the AAA's general plan of driver training was adapted to meet the special needs of the wounded men. Representing the seven amputation centers, 26 Army instructors, some themselves lacking an arm or a leg, were trained to teach driving with dual control cars.

"Behind the wheel again!" brag hundreds of servicemen who are regaining confidence in their ability to drive, while others, handling a car for the first time, look forward to the time when they will earn their drivers' licenses.

A recent demonstration at one of the Army hospitals, which exhibition can probably be equalled at other amputee centers throughout the country, showed the men driving around obstacles, stopping short and parking in a manner that few old-time drivers could equal.

Gauge Space Well

A private whose left or clutch leg had been amputated above the knee drove both forward and backward on a straight line 100 feet long. Despite his limitations, he certainly "toed" the line.

Another soldier, who lost his leg below the knee, demonstrated his ability to gauge space when steering in close limits, readily avoiding the obstacles both when driving forward and when backing. A lieutenant whose right leg had been amputated stopped smoothly in 40 feet when driving 20 miles an hour. Another, who had lost his right or brake leg below the knee, stopped the car with his front wheels, and then the bumper, right over the yellow line, then repeated the performance for his back wheels and bumper.

Another test required in order to qualify for the driving certificate of the AAA was demonstrated by a soldier, both of whose legs were missing above the knee. Quickly moving his artificial legs with his hands when necessary, this private parked parallel in the only kind of parking space you are likely to find in a crowded city block. He now holds two driving licenses—and are his fellow-patients proud of him!

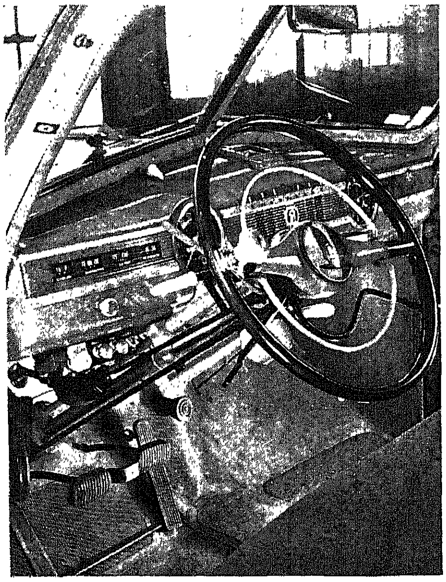
Next to learning to walk, driving is highest on the list of favorite courses at these hospitals.

One of the chief difficulties has been in convincing state authorities that the men can drive as safely as those with all limbs. For years some states have required that people with hands, feet, arms or legs missing have specified mechanical aids. Other states permitted the license applicant to select whatever equipment he felt he needed, merely demanding that he demonstrate that he can drive safely.

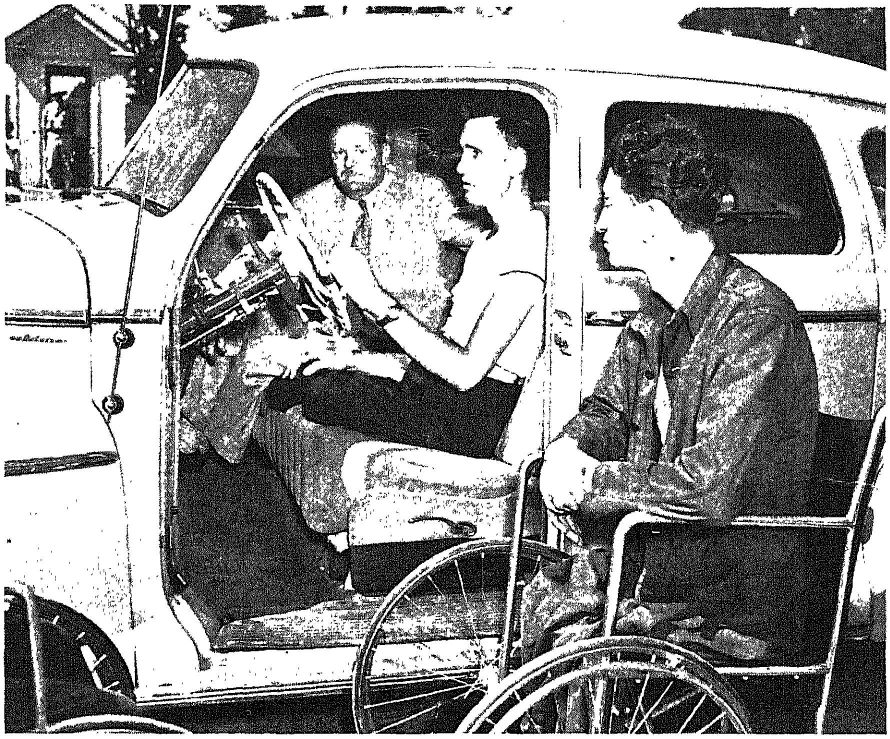
Progress is being made in this connection. Amputees at Percy Jones General Hospital, at Battle Creek, Mich., for instance, who complete the driver training course, after passing a driving test given by the Michigan State Police, are issued drivers' permits that are valid in four other states as well.

Officials of the American Association of Motor Vehicle Administrators are now working to simplify the granting of driver's licenses to disabled servicemen. This will enable those who are given drivers' examinations by state licensing officials in the various hospitals to acquire licenses for operating an automobile in their home states.

Devices which may soon be available to help disabled GI's drive more easily and safely resulted from research and actual tests carried on during recent months as a cooperative effort of the office of the Army's Surgeon General, the Society of Automotive Engineers, the Automobile Manufacturers Association



DRIVING AIDS — A few easy-to-manipulate devices are shown. Notice the steering wheel rod attached to the steering wheel, bar joining the foot pedals and extension on the accelerator. No veteran will need all of the special devices.



LITTLE TRAINING NEEDED—Specially designed devices will make it possible for the legless soldier, shown inspecting the car during a recent demonstration at Walter Reed General Hospital, to drive safely with little training.

and the American Association of Motor Vehicle Administrators.

After cataloging all the known devices —in the past many a local mechanic was called upon to create a special gadget for a cripple or infantile paralysis sufferer—the engineers set out to improve and simplify the devices, and to invent new, basic and simple aids.

As the gadgets were developed, they were installed in a car at Percy Jones General Hospital for testing. The car was successfully operated by men who each had lost from one to three limbs. As the men drove the auto and offered suggestions, further refinements and improvements were made. It was discovered, for instance, that the need for special devices is actually much less than had been anticipated.

To lower the expense of purchasing and installing the special equipment, vehicle manufacturers plan to supply packaged units which can be installed in any standard make of car by the neighborhood mechanic. The power to operate the brakes or clutch is gained from a vacuum power cylinder and control valve placed beneath the hood of the car.

These special devices will not interfere with other members of the family who want to drive the car in the usual manner. It may be, however, that others will find some of the conveniences useful on long drives and changes in the design of all automobiles eventually result from this study.

Devices Listed

No passenger car will ever need to be equipped with all the gadgets which have been developed for attachment to steering wheel post, dashboard or foot pedals —the type of disability determines which aids will be needed.

About 95% of those who have lost limbs in this war have only one arm or one leg missing. Those who have lost one leg number 9,625, three-fifths of these having lost the leg below the knee, so that their control over the artificial leg is greater. Thus far 2,875 men will return to civilian life minus an arm. Civilians also, who have lost an arm or a leg, will benefit by the training and research now being conducted to make it easier for amputees to drive.

A number of driving aids will accommodate scores of combinations of limb amputations and impairments:

Modified steering-wheel knob can be firmly gripped by a mechanical hook or artificial hand.

Hand starter control does away with the familiar foot starter button.

Steering wheel throttle and brake levers, extending either to the right or left from the steering column as desired, make it possible for a man without legs to stop the car or step on the gas.

Clutch-pedal bar permits a one-legged man to operate either clutch or brake pedal or both at the same time.

Accelerator treadle extension lets the accelerator be operated by either foot.

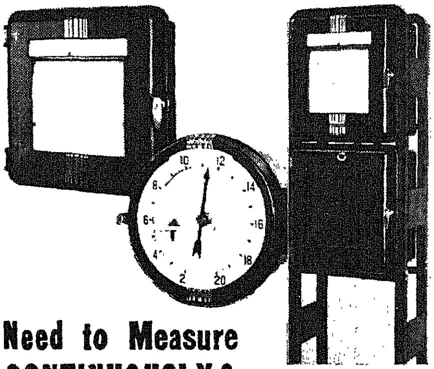
Hand service brake control permits a man without legs to stop quickly.

Automatic clutch control allows operation through accelerator treadle or interconnecting hand throttle control.

Electric direction signal eliminates hand signaling for turns.

Hill-holding device, connected with the brake and clutch, prevents the car from rolling backwards on an incline.

These devices, now receiving their final preliminary approval, will probably be available within a few months. Only a short time is needed to become accustomed to them. Prices have not yet been determined, but no profit is anticipated through their distribution. In fact,



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Do You Know?

Sweet potatoes will not stand frost, nor grow well in cool weather.

Mobile *flour mills* for liberated areas in Europe are being made in England.

Lobster eggs develop for approximately 10 months under the tail of the mother.

Flying insects have descended from wingless ancestors.

A portion of *blood plasma* leaves the capillaries to form tissue juices and is returned to the blood by lymphatic vessels.

Tomato juice is usually the most practical alternate for citrus juices at times when oranges and grapefruit are scarce or expensive.

Vegetables to be *quick-frozen* need not be sterilized but should be subjected to a blanching or scalding process to prevent loss of color, flavor, and nutritive value during the freezing storage.

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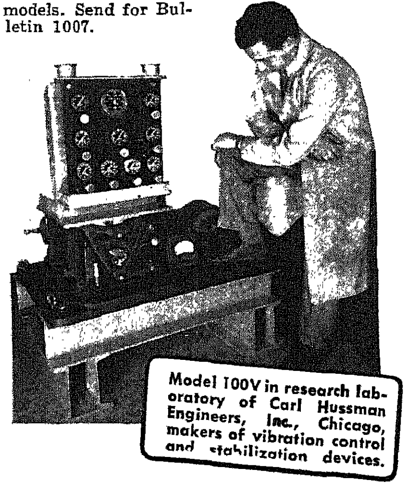

Model 100V in research laboratory of Carl Hussman Engineers, Inc., Chicago, makers of vibration control and stabilization devices.

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one auto manufacturing company has already announced that special equipment will be provided free of cost to disabled soldiers who drive that particular make of car.

Science News Letter, August 11, 1945

PSYCHIATRY

Unaware of Others

➤ AN unusual mental illness affecting children of intelligent parents in which the small patients live in a strange world of their own completely without people has been observed by Dr. Leo Kanner, child psychiatrist of Baltimore. Nearly half the families of these children are represented in *Who's Who* or in *American Men of Science,* or both.

Loving hands dressing or caring for these children are to them just hands—objects not belonging to any person. And when an adult takes away a toy or steps on something the child wants, the child becomes angry at the offending hand or foot but never so much as looks up at its owner.

Seven of the 20 children so far observed with this illness have never learned to talk, but even those who did learn to talk did not, over a period of years, use language to convey any meaning to other people. They usually do not pay any attention when they are spoken to and show no interest whatever in conversation going on around them.

Although, at one time or another, all of these children have been thought to be feeble-minded because of their strange behavior, actually all have good intelligence. Some were even considered as infant prodigies. One little boy, Charles, in a family with considerable musical talent was able at the age of only a year and a half to discriminate between 18 symphonies. He recognized the composer as soon as the first movement started and would say his name. Paul at three years knew the words of 37 songs as well as many nursery rhymes.

But the tragedy of the illness is summed up in the words of Charles' mother, "The thing that upsets me most is that I can't reach my baby." Apparently from the beginning of life these babies have lived alone "in a shell" and shut out, ignored, disregarded anything that came to them from outside. Nearly every mother reported that never had her baby held up his arms to be picked up.

Left alone, however, the children seem happy and they handle inanimate objects with skill and pleasure.

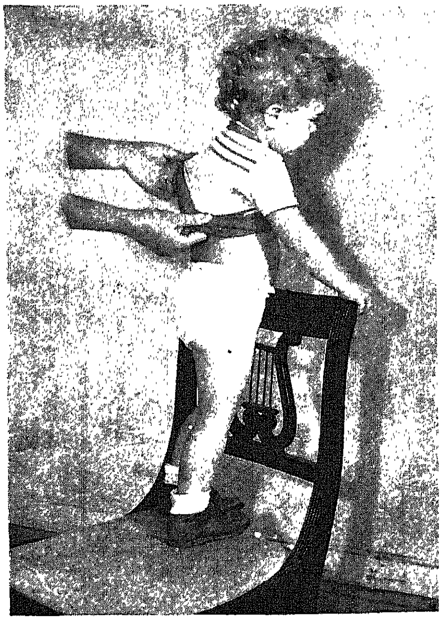
They have an anxiously obsessive desire for sameness. Changes of routine, of surroundings, even of furniture arrangement may be violently upsetting to them.

Dr. Kanner raises the question as to whether the gifts of the parents might not have actually contributed to the illness of their children. For the most part, parents, grandparents, uncles and aunts are persons strongly preoccupied with abstractions of a scientific, literary, or artistic nature and are limited in genuine interest in people. Even some of the happiest marriages are rather cold and formal affairs.

And yet the children's aloneness from birth makes it difficult to attribute the illness entirely to relations with the parents.

Science News Letter, August 11, 1945

Different varieties of *tomatoes* have different amounts of vitamin C.



JUST HANDS—Mother's hands dressing or caring for her baby are only hands and nothing more to the infant suffering from an unusual mental illness of children of intelligent parents. The child never looks up at the person belonging to the hands. This photograph was posed by the Science Service staff photographer, Fremont Davis, to show how a child with this illness might react to a mother's care.

Let's imagine it's the day after V-J Day.

Millions of American families who've patriotically suppressed their desire to go places during wartime are now anxious to be out on the road again.

But many of these families won't have a *car of their own for some time to come, for* thousands of cars will have gone out of service, and it may take years to replace them.

Won't it be only natural then for many travel-hungry Americans to turn to the buses that have served them so well during the war years? Furthermore, other millions of men, women and children will continue to rely on buses for daily transportation—to work, to school, for shopping and visiting.

Thus the bus operator's postwar job may become bigger and more difficult than ever. However, there's one factor that will tend to make things somewhat easier. That is the better gasoline that will be available. (Today the best gasoline—improved with Ethyl fluid—is still fighting.)

We of Ethyl look forward to helping the bus industry make the best use of this better gasoline certain to come. We hope, through the continuation of cooperative research and service activities, to contribute to the improvement of engines, fuels and motor transportation itself.

POST WAR CAR FOR MILLIONS OF AMERICANS

ETHYL CORPORATION, *Chrysler Building, New York 17, N. Y.*

Manufacturers of Ethyl fluid, used by oil companies to improve the antiknock quality of aviation and motor gasolines.

BOTANY

NATURE RAMBLINGS

by Frank Thone

Routing the Ragweeds

➤ VICTORY in hayfever-ridden mankind's hitherto hopeless war against ragweeds seems to be in sight, as a result of experiments with herbicidal sprays conducted by Dr. B. H. Grigsby, of Michigan State College, who is also botanist to the Michigan Department of Health (*Science*, July 27).

Two chemicals seem to offer most promise in the campaign. One is dinitro-secondary-butyl-phenol, known for greater convenience as G-412. The other is penta-chlor-phenol, whose convenience-designation is G-410. Both are applied in kerosene solutions, with pressure-spray machines.

G-412 gave the most complete kill, Dr. Grigsby reports. The vegetative portions of the plants, as well as the flower spikes, turned brown, and pollen release was stopped. G-410 gave a 75% kill in 12 hours, and permanently stopped pollen production, but some of the stems remained alive and continued growth until frost.

Despite the lower killing results reported for G-410, this compound may prove the more desirable for practical use. Dr. Grigsby points out that there is some objection to the immediate and drastic wiping out of ragweed in some spots because, pest though it is, ragweed is given to growing on loose, newly exposed soil and serves as a temporary check on erosion. The two commonest ragweed species are both annuals, so there is no harm in letting them live, if only their power to produce clouds of sneeze-provoking pollen is taken away.

The pollen-stopping chemical sprays cannot be used without caution or limit. The kerosene solvent itself is harmful to many cultivated plants. The chemicals are not toxic to human beings or domestic animals, but they do damage crop plants and so cannot be sprayed indiscriminately over fields and gardens. However, some of the worst ragweed concentrations occur along highways and railroad tracks, in over-grazed pastures, and on neglected vacant lots, rubbish dumps and other wasteland areas in and near cities. Here the weed-killing spray-artillery can be given an unlimited field of fire.

Science News Letter, August 11, 1945

CHEMISTRY

Soybean Oil Production Equals That of Cottonseed

➤ THE SOYBEAN is now Americanized, and soybean oil, its principal commercial product, is now manufactured in the United States in a quantity equal to that produced from cottonseed, which long was America's greatest source of edible oils. The soybean oil industry in America is only about two decades old, although imported soybean oil has been used for much longer than that. Wartime conditions greatly boosted production, but peacetime uses will probably keep up the present rate.

Soybean oil is used in the United States for shortening, margarine, other edible products, soap, paints and varnishes, linoleum and oilcloth, and in printing inks, but its principal use is in foods. Approximately 96% of the 1943 production was used in edible products, according to O. H. Alderks of the Soybean Research Council, reporting in *Chemical and Engineering News* (July), published by the American Chemical Society.

Some 891,000,000 pounds of soybean oil was used in 1943 in food products, he says. It has now replaced a great amount of cottonseed oil in shortening, the cottonseed oil having been shifted to other edible products. In margarine it has replaced all coconut, babassu and similar oils, and accounts for about 40% of margarine fats. In salad oils and cooking fats, 124,000,000 pounds were used in 1943, replacing the unobtainable coconut and palm oils of the Pacific area.

Soybean oil has a number of desirable qualities, Mr. Alderks states. It has generally low bleaching costs, whiter products, good rancidity behavior, and good consistency behavior. Its undesirable characteristics are poor flavor stability, particularly of the lower-grade oils, and additional cost to hydrogenate.

Flavor stability will improve, according to Mr. Alderks, with an improvement in the entire soybean industry beginning with improved farm practices, better and quicker harvesting, prompt drying when necessary, better storage, and improved methods of oil extraction.

Science News Letter, August 11, 1945

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APPROACHES TO NATIONAL UNITY, Fifth Symposium—Lyman Bryson and others, eds.—*Harper,* 1037 p., $5. Prepared for the fifth meeting of the Conference on Science, Philosophy and Religion in their Relation to the Democratic Way of Life.

CHECK-LIST OF THE BIRDS OF NEBRASKA—F. W. Haecker, R. Allyn Moser and Jane B. Swenk—*Neb. Ornithologists' Union,* 40 p., 50 cents. Reprinted from the Nebraska Bird Review, vol. 13, May, 1945.

CHICAGO NATURAL HISTORY MUSEUM: Report of the Director to the Board of Trustees for the year 1944—*Chicago Natural Hist. Museum,* 133 p., illus., paper, $1. A continuation of the report series of Field Museum of Natural History.

HIDDEN HUNGER—Icie G. Macy and Harold H. Williams—*Cattell,* 286 p., $3. The tragedy of the unbalanced diet. Humanizing Science Series.

PLANT GROWTH—L. Edwin Yocum—*Cattell,* 203 p., illus., $3. The relationship between the laws of nature and the growth of plants, written for the layman.

QUALITATIVE ANALYSIS: A Brief Outline—Harry N. Holmes—*Macmillan,* 52 p., $1.10. Ninth ed., revised.

RACE RIOTS AREN'T NECESSARY—Alfred McClung Lee—*Public Affairs Comm.,* 31 p., paper, illus., 10 cents. Prepared in cooperation with the Amer. Council on Race Relations. Public Affairs Pamphlet No. 107.

THE STORY OF THE SPRINGFIELD PLAN—Clarence I. Chatto and Alice L. Halligan—*Barnes & Noble,* 201 p., illus., $2.75. Education of one community for citizenship.

TIHUANACU, The Cradle of American Man, Vols. I and II—Ing. Arthur Posnansky—*Augustin,* 246 p., illus., $25. Parallel English and Spanish texts. English trans. by James F. Shearer.

Science News Letter, August 11, 1945

OPTICS

Anti-Aircraft Guns Given Deadlier Aim

➤ "LIGHT SPLITTER" it is called, a rectangular glass plate the size of a calling card with an exceedingly thin chemical coating on one side; used, in pairs, to give deadly aim to American anti-aircraft guns. As used in a new range-finder, the pair of light splitters, or light dividers, serve to transmit to the eye-piece two separate images, one of one color, the other of a complementary color. By superimposing one on the other, the range is automatically determined.

To range the target, the gunner, by manipulating controls on the finder, brings the two images together until a single sharp natural-colored image appears. The finder is mounted on an automatic director which computes range and height factors, and aims the battery of guns by applying the firing data to them electrically.

The light splitter, known technically as a color-selective reflector, was developed by the Radio Corporation of America. It is used in the new U. S. Army M-10 range finder, development of which has already been announced. It is a direct outgrowth of an earlier development made by RCA for the solution of a Hollywood sound-film recording problem, made before the war.

The nature and series range of the selection of chemicals which create the divider are a closely guarded secret, but upon putting to use a phenomenon which the functioning of the device depends causes a normal percentage of light to be reflected at the air-glass boundary of a glass element. It is known, also, that the dividing action is generated by the minutely-thin multiple-layer coating in conjunction with the air on its one boundary and the glass at the other, the glass itself performing no other important function except to furnish a mechanical support.

Science News Letter, August 11, 1945

"I can make a better Microscope"

Professor Gilman was startled by the statement of his guest, Charles A. Spencer. He had been exhibiting his prize possession—a microscope made by Chevalier of Paris. That was in the fall of 1846. Often during the following months, Dr. Gilman, a professor in the College of Physicians and Surgeons, New York, amused his friends with the story of the presumptuous backwoodsman who challenged the leading optician of France.

Six months later Spencer presented two objectives to the Professor.

Gilman placed them on his microscope and studied specimen after specimen. At last, bursting with excitement, he gave his verdict: "Why these are excellent! How did you do it?"

Charles Spencer took home to Canastota, New York, the first order ever given to an American for the manufacture of a microscope.

In another six months (October, 1847) the microscope was completed. On his way to deliver it, Spencer stopped at West Point to have the instrument tested by Professor J. W. Bailey, "father of microscopic research in America." Bailey was enthusiastic, acclaimed it "decidedly superior to Chevalier's" and added that it was at least equal to the Lowell instrument at Boston.

Thus Charles A. Spencer, self-taught and with only the experience gained in his homemade workshop, took his place beside the most experienced opticians of Europe.

Today, nearly a century later, the name Spencer is the hallmark of highest quality in scientific instruments. Research insures the perpetuation of the Spencer ideal.

American Optical
COMPANY
Scientific Instrument Division
Buffalo 11, New York

Manufacturers of SPENCER Scientific Instruments

New Machines and Gadgets

MINIATURE kitchens, dress suitcase size, will be used by salesmen visiting homes for possible installations. Cabinets, closets, stove and refrigerator are made to scale of stiff cardboard, and the various items can be shifted to fit any ordinary home kitchen and show the housewife how her workshop can best be arranged.

Science News Letter, August 11, 1945

SHOES with slightly hollowed heels will give proper support to the arch of the foot, it is claimed, without the need of special inserted arch supports. The rest of the shoe is shaped like the ordinary footwear, but under the heel of the foot a concave recess is formed into which the wearer's heel fits.

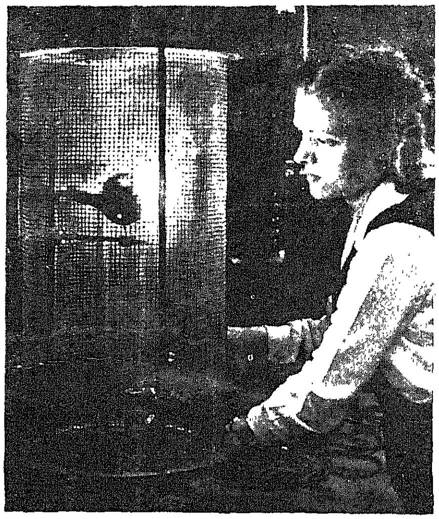
Science News Letter, August 11, 1945

ARC-OXYGEN electrode, a war development for under-water cutting of metals in sunken ships, combines the tremendous heat of the electric arc with the corrosive cutting effect of pure oxygen. It looks like an ordinary pea-shooter, and can cut a quarter-inch steel plate 40 feet under water at a rate of a foot per second.

Science News Letter, August 11, 1945

PHOSPHORESCENT plastice tape, cream-colored in daylight and blue-green in darkness, is made in three layers —the phosphorescent pigment is between a special white synthetic adhesive on its back and a clear protective film on its face. It will stick and hold to almost any material under various weather conditions.

Science News Letter, August 11, 1945



BRAZING by radiation is accomplished in the so-called hydrogen bottle shown in the picture. It is used in brazing copper parts by radiation from an incandescent filament which has a temperature of about 2,000 degrees Centigrade. The copper parts are heated to around 900 degrees.

Science News Letter, August 11, 1945

STRETCHING MACHINE, to shape aluminum extrusions to form a variety of bomber parts, consists of a table-height base upon which are mounted two hydraulic jaws, and a contour form to match the shape desired. The jaws pull the aluminum against the form with pressures up to 1,300 pounds, forcing it into shape.

Science News Letter, August 11, 1945

HYDRAULIC transmission system, used on Navy PT Boats, sends "ahead" "neutral" or "back" signals to engine room from the bridge. The signals are transmitted instantaneously, without use of electricity or other outside source of power, by this hydraulic device which automatically compensates for expansion due to temperature changes.

Science News Letter, August 11, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 271.*

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Question Box

AERONAUTICS

What plane is capable of speeds exceeding 550 miles an hour? p. 83.

AVIATION MEDICINE

What is German research being used for? p. 84.

BIOLOGY

How can oysters be "forced"? p. 89.

BIOCHEMISTRY

How has the effectiveness of sulfa drugs been improved? p. 88.

CHEMISTRY

How did colored chemical smokes help in identifying Japs? p. 88.

DENTISTRY

What may replace the familiar dentists' drill? p. 87.

ENGINEERING

What special devices make it possible for amputees to drive? p. 90.

ENTOMOLOGY

How have cattle ticks been kept in check? p. 85.

How successful has DDT been in killing mosquito larvae? p. 85.

PSYCHIATRY

What illness makes children completely unaware of others? p. 92.

PUBLIC HEALTH

What was the death rate from TB last year? p. 89.

What is the recent trend of polio cases? p. 86.

Where published sources are used they are cited.

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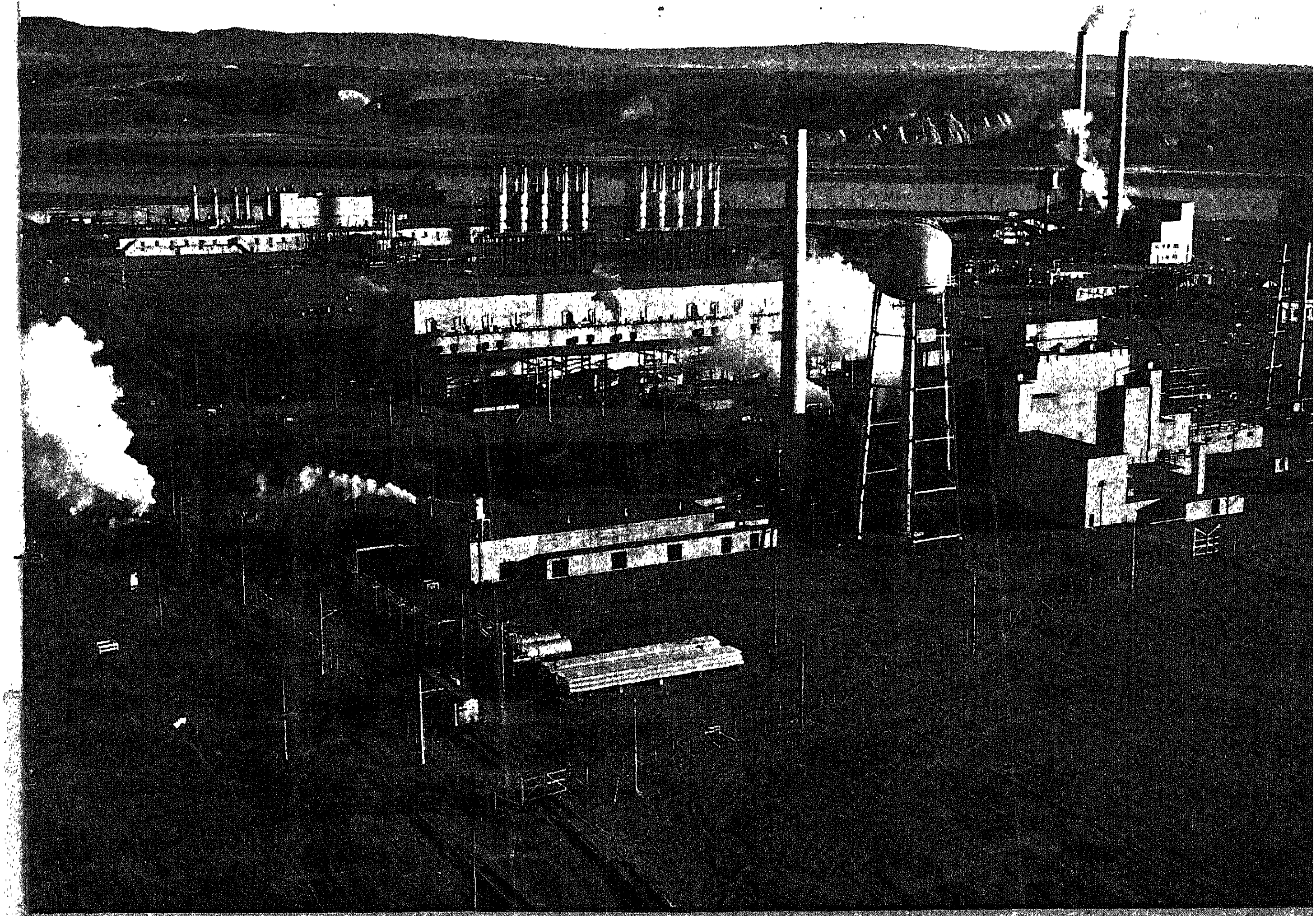
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • AUGUST 18, 1945



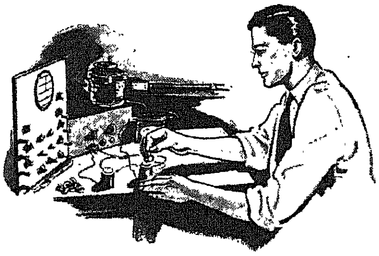
Home of Plutonium

See Page 101

A SCIENCE SERVICE PUBLICATION

a nation-wide search for scientists of tomorrow

A MAJOR NEED of America today is the discovery and development of scientific ability among boys and girls now in high school. Real ability for creative research and engineering is rare. Many who do not now have the opportunity to develop their scientific talents will be discovered and made available for America's future progress through the Science Talent Search, conducted by Science Clubs of America and sponsored by the Westinghouse Educational Foundation.

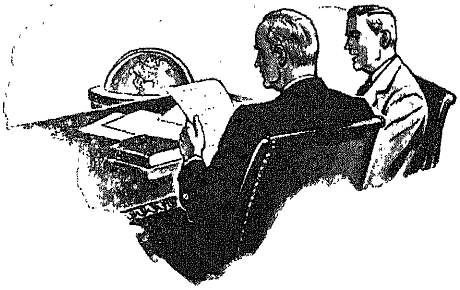


WHY THE SCIENCE TALENT SEARCH WAS STARTED

The objectives of this unique search are threefold: to discover high school seniors of exceptional scientific aptitude – to focus their attention on the need for developing scientific knowledge and skill in research – and to make the American public aware of the importance of science in their daily lives.

HOW ENTRANTS ARE TESTED

Examination of entrants in Science Talent Searches is based largely upon rigorous science aptitude tests – to determine their research ability, reasoning powers and breadth of scientific knowledge. These tests are prepared by Dr. Harold E. Edgerton and Dr. Steuart H. Britt, prominent educators and psychologists.

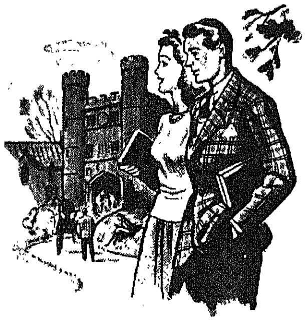


HOW THE SEARCH IS CONDUCTED

Each year, high school seniors all over America compete for Westinghouse Science Scholarships, of a total value of $11,000, by taking these aptitude tests and submitting original science essays. Selection of the 40 finalists in the Annual Science Talent Search is based upon their records in aptitude tests, scholastic standing, recommendation of teachers, and science essays, in the order given.

WHAT IT HAS ACCOMPLISHED

To date, 160 brilliant youngsters – winners of Science Talent Searches – have been awarded $41,500 in Westinghouse Science Scholarships. In addition, 429 winners of Honorable Mentions in the *first two* Science Talent Searches have received scholarships, valued at $132,450, from other sources. Of perhaps greater importance, a continuing study of one of the early Searches has disclosed that more *than 75% of those who entered this competition have actually gone to college – against a national average of only 35% for high school students!*



SEND FOR SCIENCE TALENT SEARCH LEAFLET

If you are the parent of a scientifically-gifted boy or girl who will be a high school senior this fall . . . or if you know of such talented youngsters . . . send for Science Talent Search Leaflet NL-85 which gives full information about these competitive awards. Write: Westinghouse Electric Corporation, Box 1017, Pittsburgh 30, Pa.

Westinghouse

PLANTS IN 25 CITIES OFFICES EVERYWHERE

Tune in: JOHN CHARLES THOMAS—Sunday, 2:30 pm, EWT, NBC • TED MALONE—Monday through Friday, 11:45 am, EWT, Blue Network

PHYSICS

Mass Collaboration

Atomic bomb is a world-shaking example of what can be accomplished by pooling scientific resources. German racist policy, Jap isolation, now seen as suicidal.

➤ ATOMIC bombs, bursting over Japanese military and industrial key-points like Doomsday thunderbolts, herald a revolution in war such as has not been seen since the first use of gunpowder, and later on another revolution in industry probably greater than the one ushered in by the invention of the steam engine. Chemical energies heretofore used, as in the explosion of TNT or the burning of coal, have originated only by ripping molecules apart and rearranging the whole atoms of which they are made up; this new physical development of power involves splitting open the atoms themselves and loosing the vastly greater energies that tie together their electrons and protons.

The power development is new, but the idea back of it is old—old as the alchemies of ancient China and Arabia, that slowly crept towards the dawn of modern science through the solitary labors of primitive researchers like Roger Bacon and Albertus Magnus in the Middle Ages.

That it could be brought to realization now is due more than anything else to the fact that researchers are no longer solitary. American, British and Canadian scientists pooled resources, and enormous sums of money—probably more than has ever been spent on any research project in history—were made available to them in their race against time—and the enemy.

The enemy, for his part, played into our hands, partly because he couldn't help himself, partly through his own blind prejudices. The enemy was divided from the first: Japan was far from the rest of the Axis and had relatively few scientists and not much in the way of equipment and raw material for the particular kind of production required; Germany, much better off in both respects, deliberately threw away some of her best brains because of a lunatic distaste for the owners' racial or religious connections.

The Germans even lost aid that they might have gained from scientists in neutral countries, through their ruthless military policy. One of the world's leaders in the atom-splitting field, Prof. Neils Bohr of the University of Copenhagen, found it necessary to leave his country and take refuge in Sweden, later going to England and then to the United States. German scientists called in by the Nazis to take over his laboratory declined to receive such stolen property. Only since the close of hostilities has Prof. Bohr returned to Copenhagen.

Science News Letter, August 18, 1945

PHYSICS

Cars Will Run on Gas, Not Atomic Power

➤ YOUR first postwar car and its successors for a good many years to come will run on gasoline, not atomic power, it appears from the conclusions of a committee appointed to look into its possible peaceful uses.

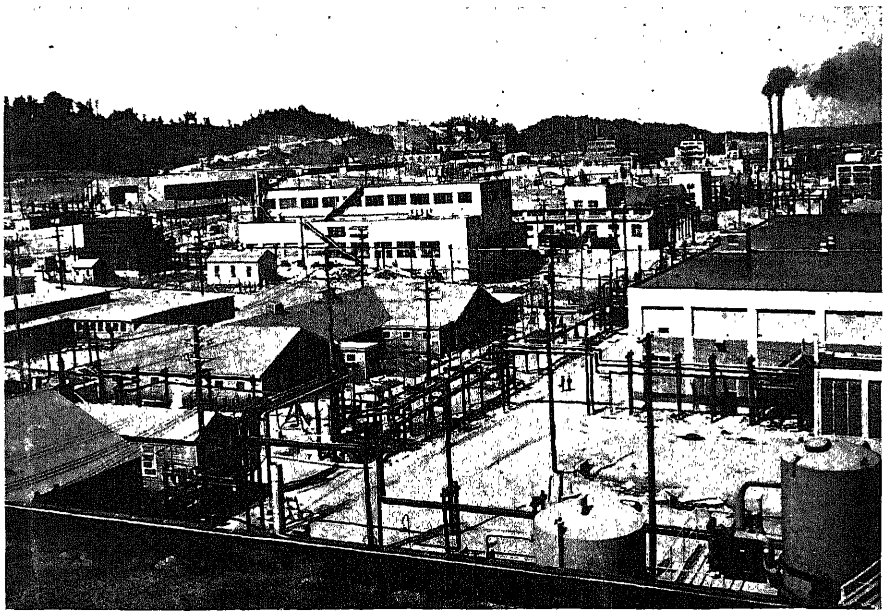
Within ten years practical non-military use of this power could be expected but only for "special purposes."

The committee's conclusions were released by the War Department with other technical information about the atomic bomb. Members of the committee, appointed by Maj. Gen. L. R. Groves in the fall of 1944, were: Dr. R. C. Tolman, California Institute of Technology, chairman; Rear Admiral E. W. Mills, USN, with Capt. T. A. Solberg, USN, as deputy; Dr. W. K. Lewis of Massachusetts Institute of Technology, and Dr. H. D. Smyth of Princeton University and author of the technical report.

"While there was general agreement that a great industry might eventually arise, comparable, perhaps, with the electronics industry, there was disagreement as to how rapidly such an industry would grow; the consensus was that the growth would be slow over a period of many years," the committee reported.

"At least there is no immediate prospect of running cars with nuclear power or lighting houses with radioactive lamps although there is a good probability that nuclear power for special purposes could be developed within ten years and that plentiful supplies of radioactive materials can have a profound effect on scientific research and perhaps on the treatment of certain diseases in a similar period."

Destructive possibilities of nuclear power were also considered. Improvements in processes of producing source material and in its use are believed reasonably certain. The energy released in splitting the uranium atom corresponds to the utilization of only about one-tenth



PRODUCTION PLANT—Seen in this official U. S. Army photograph, is an air view of the giant production plants at the Clinton Engineer Works at Oak Ridge, Tenn.

of 1% of its mass. This might be stepped up by the "conceivable" future discovery of totally different methods for converting matter into energy. On this point the committee warned:

"Should a scheme be devised for converting to energy even as much as a few per cent of the matter of some common material, civilization would have the means to commit suicide at will."

Science News Letter, August 18, 1945

PHYSICS

New Responsibilities

If we are on the verge of an Atomic Age, in industry and in war, it is bound to be an age of federated powers, bound together by common necessity and purpose.

By FRANK THONE

➤ LYING on the wide stone balustrades that flank the entrances to the State Department building in Washington are some 18th-century bronze cannon. Similar pieces may be seen in some state capitals and in museums. Beautifully wrought, they are works of art as well as ordnance. They are trophies taken from old Spanish forts in Cuba, and they bear an arrogant motto in Latin: "Ultimo Ratio Regum—The Final Argument of Kings."

These monuments of the Age of Gunpowder, the twilight of which may even now be coming upon us, archaic though they are, may still have a modern lesson to teach. Gunpowder, we have often been told, spelled the end of the feudal period, in which every earl and baron was a little monarch in his own right, and the beginning of the modern state because armored knights could not stand up against their overwhelming blasts.

That is not strictly accurate. Armored knights were doomed in the field about the time gunpowder came in, but it was not primarily by cannon. The archers of Agincourt, with their strictly medieval longbows, had shown that the unarmored man on foot could defeat the armored man on horseback.

But the knight could retire behind the walls of his castle, where arrows could annoy him but not undo him. Here is where the cannon came in. Even the most primitive tubes, hurling stone balls instead of steel projectiles, could batter down the oaken gates or breach the stone walls for the final storming.

Cannon were costly, and the hire of cannoneers was high, so that only kings could afford to maintain one of these new-fangled siege trains. The resources of a baron, or even of a mighty earl, just wouldn't stretch that far. So the independence of the nobles went out in clouds of smoke from the "villainous saltpeter," and the modern state, typified at first by monarchy, rode in over the castle ruins.

What has all this medieval history to do with today—the day of the atomic bomb?

A great deal. Recall the bill for the production of the first atomic bomb: two billion dollars. And the pooling of the best scientific brains in two great world powers to think the thing out—not forgetting the rich free gifts we got from the enemy in the shape of eminent exiles. And the building of whole new cities to put it together. And the marshalling of the world's greatest fleets of aircraft and warships to bring it to the threshold of the doomed enemy.

No small power, no matter how intelligent or industrious or heroic its people, could have brought to a focus such a mass of material and intellectual resources as was needed to produce this weapon. No Denmark, no Belgium, no Switzerland could have managed the job: superb though such nations may be qualitatively, they are insufficient quantitatively.

If we are on the verge of an Atomic Age, in industry as well as in war, it seems bound to be an age of great powers—or of federated powers, bound together by a common necessity and a common purpose. If cannon were the final argument of kings, atomic power is the last word of great powers. This has apparently already happened without our realizing it in the case of the United States and the British Commonwealth. Whether we fancy it or not, these two great composite powers are now welded by a ring not of gold but of uranium.

What of the powers outside this ring? Well, were we fascists at heart, we know what would be their fate—or if we don't realize it yet we shall see it presently written in the ruins of Japanese cities. The USSR and China might eventually be situated to oppose us with equally dreadful weapons—they have, potentially at least, the numbers, brains and perhaps the necessary mineral resources to bring on what would undoubtedly be the world's Ragnorok. And they might pick up stray Nazified scientists to help them, if they should come to hate and envy us.

But it would seem the better part of sanity, to look and hope for a turning of all the powers, great as well as small, along the road of peace made possible at last by an abundance of power for all.

Science News Letter, August 18, 1945

SCIENCE NEWS LETTER

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CHEMISTRY

Uranium Sources

It occurs in various chemical forms in Czechoslovakia, Belgian Congo, Canada, Utah and Colorado. Prewar radium-uranium ore obtained from Congo and Canada.

➤ URANIUM, classed by chemists as a minor metal but now perhaps playing a major part in atomic bombs, occurs in various chemical forms in widely scattered countries of the world on at least three continents, North America, Europe and Africa. Pitchblende, a form of uranium oxide, is mined in the Belgian Congo, in Bohemia in Czechoslovakia, and at Great Bear Lake, Northwest Territory, Canada. Carnotite, a uranium and vanadium salt of potassium, is found in Utah and Colorado.

Nearly the entire world output of radium-uranium ore prior to the war was mined at Great Bear Lake and in the Belgian Congo. Mines in both countries were inoperative during 1941, but the Canada company had stockpiles at its refinery at Port Hope, Ontario, and enjoyed its best sales year that year. Mining began again in 1942. The German occupation of Belgium in May, 1940, closed the Belgian refinery at Oolen, near Antwerp, where the African ore was refined, but the Germans captured no stocks there.

The German supply of radium-uranium ore, during the war, was the relatively small amount available from St. Joachimsthal in Czechoslovakia. The Germans did not use the Belgian refinery because there was no ore for it. The stocks at Oolen, including all of the radium and part of the uranium, had been moved to the United States before the invasion.

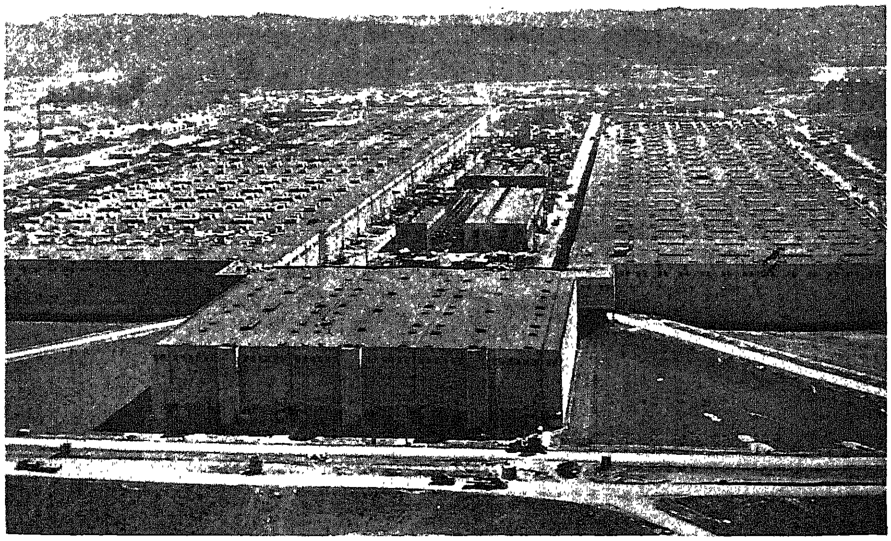
During the European war, the United Nations were in a favorable position as regards radium and uranium. These countries possessed an estimated two-thirds of the world radium supply and three-fourths of the uranium. Also they controlled approximately 95% of all the known ore reserves.

The carnotite ore mined in western Colorado and eastern Utah yields radium, uranium and vanadium. The production did not meet domestic needs, however, and considerable radium salts, radioactive substitutes, and uranium oxide and salts were imported.

The principal uses of uranium (not including its use in atomic bombs) is in ceramics, luminescent paints, tool steels and chemicals. Uranium oxides color pottery glazes and porcelain bodies black, gray, brown or green in a reducing environment, and yellow, orange, or red under oxidizing conditions. Sodium uranate and sodium uranyl carbonate produce the fluorescence typical of uranium glasses.

Uranium salts are incorporated in luminescent paints, either for their own fluorescence, or as activators for such accessory compounds as zinc-cadmium sulfide and beryllium oxide. Uranium imparts desirable properties to steel tools. It is used in the steel as a ferrouranium or in an alloy with nickel. It is used in obtaining a stainless silverware, and as a catalyst in a number of organic chemical reactions.

Science News Letter, August 18, 1945



ATOMIC FISSION PLANT—Another view of one of the gigantic production areas at the Clinton Engineer Works at Oak Ridge, Tenn. Shown on the front cover of this SCIENCE NEWS LETTER, is one of the production areas at the Hanford Engineer Works near Pasco, Washington.

PHYSICS

Atoms Are Like Miniature Solar Systems

➤ THE ATOM is the one fundamental unit of matter in the universe. Everything is made of atoms. The only difference between the coal in your furnace, the phosphorus in the match that lights it and the oxygen in the air that makes them burn is that their atoms are made of slightly different arrangements of the same electrical forces. It is these electrical forces that disintegrate the atom and give out atomic power.

Atoms are like miniature solar systems, whose suns are spots of positive electricity and whose planets are electrons. The atoms of the various chemical elements are built of different numbers of electrons. The atoms of uranium are the largest known. Scientists believe they are too large to hold together and that this accounts for the fact that this heavy metal is constantly breaking down into lighter elements, thorium, radium and lead, giving off the strange gas, radon, which is heavier than lead, and showing loss of energy by glowing in the dark.

For nearly half a century the fact of atomic disintegration has been known. But no one knew how to make use of the energy given off by the exploding atoms. Here and there a few electrons would break away from their tiny orbits, throwing the system into confusion, liberating energy as heat and light. Compared to the size of the atom, the quantities of energy liberated are enormous. But no one could predict just when the atoms would explode, or make them do it where the released energy could be made to do useful work. This was the situation at the beginning of the war. Our scientists were almost on the verge of this discovery. But so were the Germans. The race for solving the problem of using the energy locked up in the quiet atoms has been won by our side, and just in time.

Science News Letter, August 18, 1945

PHYSICS

Rapid Assembling

Atomic bomb parts are made to assemble themselves just before detonation. One method would be shooting one part from a gun against a target which is the second part.

➤ TO PREVENT the atomic bomb which wrecked Japanese cities from going off prematurely in a harmless fizzle, the bomb was constructed in such a way that its various parts would assemble themselves at the moment when the explosion was desired. This is revealed in a technical report by Dr. H. D. Smyth, of Princeton University, recently released by the War Department.

This rapid assembling can be done by shooting one part as a projectile from a gun against a target which is the second part of the bomb.

Weight of the projectile, its speed and the caliber of the gun need not be far from the range of standard ordnance practice. But new problems were introduced by the fact that it was necessary to have sudden and perfect contact between projectile and target and by the fact that gun, projectile and target all had to be "portable."

The reason why assembly could not be done until the very last minute is because of what is known as the "chain reaction." When you light a fire, Dr. Smyth explains, you set in motion such a chain reaction. The match releases enough energy to ignite some fuel which releases more heat to set fire to more fuel and so on.

If atomic energy is to be practical for large-scale use, such chain reactions must be set up. This is not always easy. It all depends on whether more neutrons are produced by the splitting of the atoms than are lost through escape, through capture without atom-smashing by the uranium atoms, or by capture without smashing by impurities. Neutrons released by atom splitting of uranium-235 have very high speeds. To prevent the escape, they must be slowed down.

In a bomb, while it is necessary to have this chain reaction, the chain must not be started too soon. With all the conditions made purposely favorable for a chain reaction, precautions must be taken to prevent its being set off accidentally. Cosmic rays with which we are constantly being bombarded from outside space could set it off. So could the spontaneous splitting of an atom, or reactions in impurities.

It is for this reason that all the parts of the bomb must not be assembled until the moment when it is ready for explosion.

As used in combat, the bomb is detonated at such a height above the ground that the blast effect against structures will be at a maximum and the radioactive products will be spread in a cloud and carried upward in an ascending column of hot air and dispersed harmlessly over a wide area.

Science News Letter, August 18, 1945

BEGINNING—Prof. E. O. Lawrence, of the University of California, holds in his hands the small beginning of the cyclotron.

PHYSICS

Idea for Plutonium Bomb Credited to Dr. Lawrence

➤ IDEA for the atomic bomb using the new element plutonium is credited to Dr. E. O. Lawrence, of the University of California, in the official report written by Dr. H. D. Smyth, of Princeton University, and released by the War Department.

In a memorandum submitted to a committee of the National Academy of Sciences in May, 1941, seven months before Pearl Harbor, Dr. Lawrence included what the report terms "an important idea not specifically emphasized by others, namely, the production of large quantities of plutonium for use in a bomb." Dr. Lawrence is quoted as saying:

"If a chain reaction with unseparated isotopes is achieved, it may be allowed to proceed violently for a period of time for the express purpose of manufacturing element 94 in substantial amounts . . .

"If large amounts of element 94 were available it is likely that a chain reaction with fast neutrons could be produced. In such a reaction the energy would be released at an explosive rate which might be described as a 'super bomb.' "

Science News Letter, August 18, 1945

PUBLIC HEALTH

Polio Cases Increase Slightly Over Nation

➤ INFANTILE paralysis cases increased slightly throughout the nation for the week ending Aug. 4 but the total number, 476, was only just over half the total for the corresponding week last year when cases mounted to 932.

The week's increase of 22 cases over the previous week was much less than the increase of 175 cases in the corresponding week last year.

Cases will probably continue to increase for another three or four weeks before beginning to decline. The peak of the rise during the epidemic last year was reached the week ending Sept. 2.

States reporting biggest increases for the week ending Aug. 4 were New Jersey, Pennsylvania, Illinois and New York. Decreases were reported from Virginia, Tennessee and Texas.

Science News Letter, August 18, 1945

CHEMISTRY

Made to Order

Two elements produced from scientific blueprints to get power for atomic bomb. Have been named Plutonium and Neptunium following names of planets.

➤ CREATION, on a large scale, of two new chemical elements not found in nature was one of the feats accomplished by scientists who developed the atomic bomb. Some of the details of this achievement, which outstrips the wildest dreams of ancient alchemists striving to transform one metal into another, are related by Dr. H. D. Smyth, of Princeton University, in the technical report released by the War Department.

The new elements were planned and then made to order out of uranium to obtain power for the atomic bomb. Scientists had known of their existence. Before 1940, however, the knowledge had been about that which a man has of a woman whose beautiful face flashes by him as he looks from a train window into the windows of another train going in the opposite direction.

Uranium had long been projected as the material from which atomic power might some day be obtained. Occurring in a number of similar forms, known to the chemists as isotopes, only one isotope was found to be useful for the atom-splitting process from which atomic power is practical. In the course of the investigations leading to the atomic bomb invention, it was found that it would be easier to use the uranium as it comes from the ore to create an entirely new element, and then split that new element, than it would to separate uranium's isotopes and remove the more abundant kind which is useless for direct production of energy.

An extremely minute amount of material which it was thought might be one of the elements heavier than uranium, which are theoretically possible, had been made before the war. The Italian chemist Fermi believed he had traces of more than one of these heavy metals, which he called the "transuranian elements." These elements were believed on theoretical grounds to be radioactive. Beyond this, nothing was known of them, and many scientists doubted their existence.

Reasoning from analogy with behavior of other radioactive elements in changing into one another spontaneously, physicists of the War Department's research teams worked out methods which should build uranium into these heavier elements, and succeeded in creating two of them.

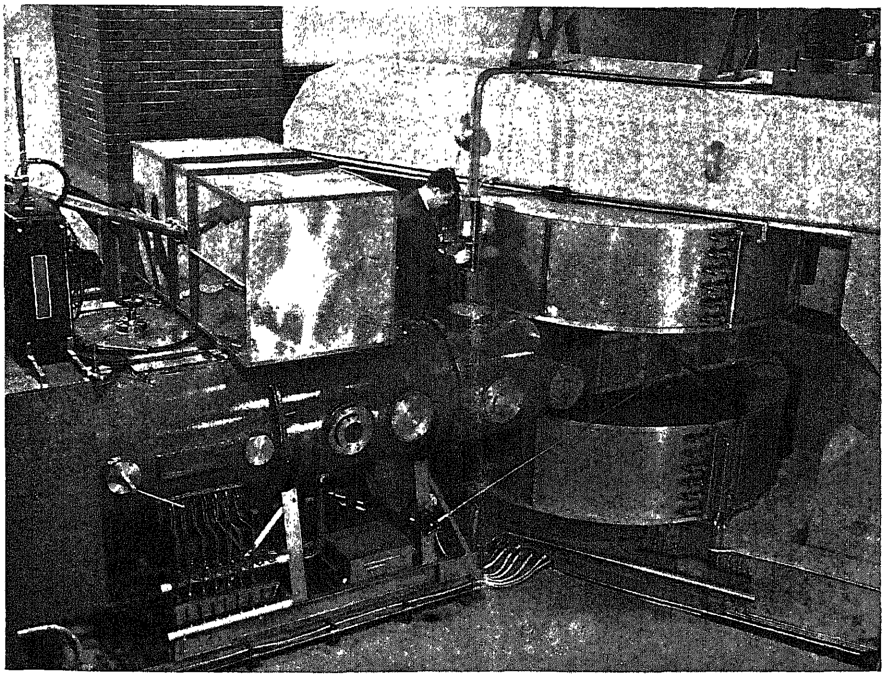
They are the next neighbors of uranium in the chemist's periodic table of elements. Uranium is element number 92, the new elements are 93 and 94.

As soon as these new elements began to be manufactured in quantity it was necessary to have names to call them by. Borrowing the names of the planets in our solar system, the new elements were named Neptunium (symbol Np) and Plutonium (symbol Pu). Neptunium is 93, Plutonium is 94.

The atomic weights of all these elements are very close together. Due to the large number of isotopes which uranium forms, its weight may be anywhere from 234 to 239. The kind whose weight is 235 is the one most active in atomic disintegration.

Both the new elements seem to claim 239 as their atomic weights. The atomic weight of an element depends on the number of protons and neutrons which make up the heart of its atom.

Science News Letter, August 18, 1945



ATOM SMASHER—This is the cyclotron at the Carnegie Institution of Washington used in research on atom splitting. This photograph was first used on the front cover of SNL, June 3, 1944.

METALLURGY

Laboratory Ware Material Combines Platinum Alloys

➤ A NEW platinum material, for laboratory ware such as crucibles and other articles now made of platinum alone, has been developed in Baltimore, Md., and is a combination of all platinum-family alloys. The new product, developed because of war necessity and now thoroughly tested in actual use, is claimed to be superior to the platinum ware it may replace.

The new material is a product of the Oscap Manufacturing Company, and it has been tested over months in Army, industrial and university chemical laboratories, and found satisfactory in all, it is declared.

The color of the new material is the silver gray of regular platinum, but slightly darker. It is non-oxidizable, has high tensile strength and flexibility, and is resistant to all acids except boiling aqua regia, a mixture of concentrated hydrochloric and nitric acids.

Science News Letter, August 18, 1945

Young *hawks* must be fed every two hours from daybreak until dark.

METALLURGY

Jet Condensation Method For Recovering Magnesium

➤ MAGNESIUM, the featherweight metal that has come into its own during the war, presents one difficulty in separation from its compounds. Like the hitherto more familiar zinc, it evaporates readily, and in its vapor state is apt to come out of the smelter mixed with other gases, from which it must be separated. To accomplish this economically, D. S. Chisholm and Thomas Griswold, Jr., both employed by the Dow Chemical Company of Midland, Mich., have developed what might be termed a jet condensation method, on which U. S. patents 2,381,403 and 2,381,405 have been issued. The two processes are alike in their principal steps, differing only in one detail. The magnesium-containing vapor mixture is carried in a conduit to the top of a tall, narrow tower in which a partial vacuum is maintained. The tower top has a narrow constriction, into which a nozzle squirts a stream of a condensing fluid, rapidly enough to keep the tower filled.

In Mr. Chisholm's method this fluid is liquid magnesium, which though hot is sufficiently cooler than the vapor to condense and thus capture it. In Mr. Griswold's method, some other liquid is used; it is a matter of indifference what, so long as it will not react chemically with the magnesium. Rights in both patents are assigned to the Dow Chemical Company.

Science News Letter, August 18, 1945

BOTANY

Mushrooms Live 35 Years Sealed Up in Glass Tubes

➤ MUSHROOMS, proverbially shortest-lived of plants, have been proven capable of living for more than a generation sealed up in glass tubes under high vacuum, thanks to the unexpected outcome of a near-forgotten experiment started in 1910 by an eminent Canadian botanist, the late Prof. A. H. R. Buller of the University of Winnipeg.

In that year, Prof. Buller, then visiting the Imperial Mycological Institute at Kew, near London, placed in a number of glass tubes the caps of a tough, thin-fleshed little mushroom known botanically as *Schizophyllum commune,* a species that is capable of surviving considerable drought under natural conditions. Air was pumped out of the tubes to a pressure of less than 0.1 millimeter of mercury. The tubes were then sealed off and stored in the dark at ordinary room temperatures. Just to make things tougher, some of the tubes were kept immersed in liquid air for a period of three weeks.

It was Prof. Buller's intention to open these tubes at intervals, up to a final limit of 25 years, and find out whether the mushroom tissue was still alive. For some reason, however, the tubes were set aside and apparently forgotten before the second year was up, when only four of them had been opened.

Recently, Dr. G. R. Bisby of the Institute staff came upon Prof. Buller's notes and the remaining unopened tubes, now approximately 35 years old—10 years over the originally planned maximum time limit. Dr. Bisby has thus far opened four of the tubes and tested the material in them. He found some of the mushroom caps still capable of producing viable spores—considered a satisfactory proof of life in mushrooms. He still has 11 of the tubes, which he intends to keep for future experiments.

Report on the unexpectedly long life of mushrooms under these hard conditions is given in the British science journal, *Nature.*

Science News Letter, August 18, 1945

MECHANICS

Horseshoes Repaired By Electric Arc Welding

➤ HORSESHOEING will be the post-war work of some expert electric arc welders now building ships if a modern method of shoe repairing followed by a veteran blacksmith in Coshocton, Ohio, becomes a general practice.

The welding blacksmith repairs shoes while still on the horse's hoof, building them up or adding spurs to prevent slipping, by arc-welding strips of metal or caulks on them. Most horses do not object to the new procedure.

Old shoes can be built up this way a couple of times, Charles H. Chism, Coshocton blacksmith, has found through tests. The heat of the arc, or of the heated shoe, does not affect the animal. In fact, the shoe during the welding process is not as hot as the shoe in the ordinary fitting process which is placed while almost red hot against the hoof to burn it enough to get a good fit. When the welding is completed, shoe and hoof are cooled with water. Some horses are disturbed by the flash of the arc, Mr. Chism found, but are not troubled if a blanket is thrown over their heads.

Science News Letter, August 18, 1945

IN SCIEN

PUBLIC HEALTH

Protect Children From Tuberculosis

➤ MOST people think of tuberculosis as a disease or sickness. We are particularly likely to think of it as the lung sickness formerly called consumption. Doctors, however, know that the disease really starts when the tuberculosis germs first get into the body and certain defending blood cells, called neutrophils, go into action against them. At this stage of the disease or infection, the patient may not be sick at all. Usually he is not.

Children may get this stage of tuberculosis long before they are 12 years old. Whether the disease develops in their teens or early adulthood to the point of causing illness or death depends on whether reinfection develops.

Reinfections are more dangerous to the child than the first infection with tuberculosis germs. This is because after the first infection, his body tissues have become so sensitized to the protein of the tuberculosis germs that this substance is now a deadly poison to his body.

Such reinfections may come from tuberculosis germs spread by some person in contact with the child. Parents and other relatives, nurses, teachers, and boarders or roomers in his home may be spreading living tuberculosis germs without knowing it. Or the living germs in the child's own body may escape the walls which nature built around them when they first invaded.

All children should be protected from invasion of tuberculosis germs. Children who have had one infection need even more care to protect them from a second infection. Parents, doctors and health authorities can do a better job of this if they know which children have already been infected. This can be determined by the tuberculin test.

Tuberculin testing of school children was a common practice in many communities some years ago. Then enthusiasm waned and efforts were concentrated on X-ray detection. Tuberculin testing of school children, however, should continue, Drs. J. A. Myers and F. E. Harrington of Minneapolis and Dr. E. Garcia Suarez, of Santiago, Chile, declare in a report to the *Journal of the American Medical Association.*

Science News Letter, August 18, 1945

CHEMISTRY

Less Vitamin A Is Being Produced

➤ ONLY about half as much vitamin A, obtained commercially from the livers and other viscera of fish, is being produced in the United States today as two years ago, according to the Fish and Wildlife Service. Various specimens of shark furnish about 75 per cent of the total output.

Early last year a decline in the number of valuable soupfin shark caught began to be apparent, and during the first five months of this year only 7.7 trillion units of Vitamin A were secured from this source, as compared with 15.9 trillion units during the same period for 1943. This decline has been partly offset by an increase in the fishery for dogfish, another small shark, but dogfish liver oil is much less potent than that obtained from the soupfin shark.

Science News Letter, August 18, 1945

CHEMISTRY

Splitting Uranium Atom May Yield Many Elements

➤ SPLITTING the uranium atom produces atoms of other chemicals. Just what other chemicals result depends upon how the splitting takes place.

Up to 1939, not long before the war emergency put a blanket of secrecy over all atomic research, six chemical elements had already been identified as resulting from the splitting of the uranium atom. They are: barium, lanthanum, strontium, yttrium, xenon and caesium.

Uranium exists with several different atomic weights. These different forms of uranium are chemical twins—they are exactly alike in every way except for weight, and are called isotopes. The isotopes of uranium found before the war to be most promising for the atom-splitting work were uranium 235, uranium 238, and uranium 239. Uranium 235 was the one found in nature which was most useful in research on the bomb.

When the splitting occurs, the resulting atoms must have hearts whose protons would add up to the correct number for uranium, 92.

Thus, if uranium 235 were split in two equal parts the resulting atom would have about 46 protons. The chemical having the number nearest to this is paladium. But this is difficult to do.

Barium, the first element actually identified as resulting from uranium splitting has an atomic number of 56. The element which would bring the total up to 92 would be the inert gas krypton.

Light elements such as strontium, with an atomic number of 38, and yttrium, with atomic number of 39, may appear if the uranium atom is split into three parts instead of two. These numbers if combined with the number for phosphorus would add up to about the right number for uranium.

But it is not necessarily true that one atom of each element would be secured as the result of the splitting. Two atoms of strontium might be obtained, in which case the element needed to make up the additional number would be silicon.

Science News Letter, August 18, 1945

PHYSIOLOGY

Flying Is Suggested As Best for Relaxation

➤ FLYING is suggested as the one sport guaranteed to take a doctor's mind away from medicine. Fishing allows too much time to think, golf may involve others with whom he can discuss "interesting cases," and even just a visit with friends often calls for minor medical advice.

Flying along three or four thousand feet above sea level, away from telephones, offers a chance for the physician to see the forests instead of the trees. Irritations that seem large at the office or home fade away as one looks at the magnificent scenery. And for the blase, the Rocky Mountain Medical Journal suggests tailspins. There are few doctors who, in the process of tailspins, could think of anything else but tailspins.

Science News Letter, August 18, 1945

ENGINEERING

Rubber as Binder For Grinding Wheels

➤ A RUBBER emery wheel might sound like a contradiction in terms, yet this is the invention on which patents 2,381,267 and 2,381,268 have been granted to Charles E. Drake of Bloomfield, N. J. Rubber, either natural or synthetic, is used as a matrix or binder for the abrasive particles, together with enough sulfur to effect the necessary vulcanization. Rights in the patent are assigned to the United States Rubber Company.

Science News Letter, August 18, 1945

CHEMISTRY

Paintbrush Bristles Are Made From Milk Casein

➤ THE LOWLY hog has another rival: paintbrush bristles can be made from casein, a principal ingredient of milk. Casein, a protein, has been successfully made into artificial bristles for paint brushes that have good paint-carrying capacity, make smooth films and have good wear resistance. The present shortage of pig bristles and other coarse animal hair is responsible for the development. Nylon bristles are already in use, but the civilian supply is still short.

The development work was carried out by scientists of the Eastern Regional Laboratory of the U. S. Department of Agriculture, at Philadelphia (*Industrial and Engineering Chemistry*).

These scientists developed a relatively simple method for making suitable bristle material, using commercial acid-precipitating casein. They mixed the casein with water, heated the mixture to a plastitc mass, and then forced it through a die with holes of suitable size. They then streteched the fiber and hardened it with quinone alone, or with quinone followed by formaldehyde. With this latter treatment the fiber is further hardened and is made more risistant to water, they report.

The paint brushes made with this casein bristle are resistant to oils and fat solvents, but soften when allowed to stand in water.

Science News Letter, August 18, 1945

CHEMISTRY

Bone Removes Excess Fluorine from Water

➤ THE ELEMENT fluorine in drinking water, which is good for teeth when present in exceedingly small amounts, is very bad for them when there is too much of it, causing an ugly, disfiguring, mottled appearance. To reduce the fluorine to a safe level, in regions where there is an excess of it in the water, is the objective of patent 2,380,800, granted to Howard V. Smith and Margaret C. Smith, of Tucson, Ariz.

They use a filter containing crushed bone, which has a strong affinity for fluorine. The bone is first treated with an alkali, to remove what fluorine is already present, then with an acid, to wash out the alkali and the fluorine which it has chemically captured, finally with another acid to neutralize the bone, after which it is put into use.

Science News Letter, August 18, 1945

PHYSICS

Power from Speed

The speed with which the parts of the atom are moving is the secret of the atom's power. And this power is released by means of speed.

➤ SPEED is the secret of the atom's power—the speed with which the parts of the atom are moving. And it is by means of speed that this power has been released.

As pictured by modern science, atoms are like tiny solar systems with the electrons swinging in tiny orbits around a miniature sun. But the "years" in which the electrons complete their journey around their sun go flying by millions of millions of times in each second.

Speed is one form of energy, kinetic energy. And it is one of the axioms of science that although energy can never be created or destroyed, it is always possible to change it from one form to another, provided you know how. Thus, kinetic energy can always be converted to heat or it can be made to do work. The whole trick is in knowing how. And, so far as the atom is concerned, its great wealth of energy has through the ages been securely locked behind the barrier of its outer orbit of electrons.

It is the speed of these flying electrons that has made the atom so impenetrable. There is plenty of room between the electrons. You might think that it would be easy to invade the atom through all this empty space—just as there is plenty of room for airplanes to fly between the earth and Mars. But it is not. And that is because the electrons are moving so fast that they keep everything out as effectively as if they were everywhere at once.

This is easy to understand if you look at an electric fan. When the fan is still, it is easy enough to put your hand between the blades—there is plenty of room. But just try to shoot peas at a revolving fan! It is only the lucky hit that will manage to fly between two blades and get through—and it has to be a pretty small pea at that.

The only thing that can be shot into an atom is a fragment of another atom: a proton, a neutron or an electron. And it must be shot with great speed. In the research on the atomic bomb, neutrons are used as projectiles, some are shot at tremendous speeds, others at speeds relatively slower. Details on such matters are naturally not available now.

Often, the atomic projectile will go right on through the atom without doing anything—just as comets shoot through the solar system without touching anything. But somehow, scientists have at last found the secret for which many learned men have sought for many years—how to use the atomic projectile effectively to disintegrate the atomic heart.

Atom-smashing results in the release of a tremendous electric charge. The discovery is truly great, but even greater is the discovery of how to control this tremendous weapon to do man's will.

WORKED ON BOMB—Dr. Richard C. Tolman (left), of Washington, normally of the Graduate School of the California Institute of Technology, has served as a special adviser to Major General L. R. Groves (right), Officer in Charge of the Manhattan Engineer District, in the development of the atomic bomb. Official U. S. Army photograph.

Power of the Atom

➤ HERE IS what atomic energy could do if and when it is ever made fully available to work for man:

Smashing the atoms in one pound of water would create enough energy to heat 100 million tons of water from freezing to boiling temperature.

A breath of air would operate a powerful airplane for a year continuously.

A handful of snow would heat a large apartment house for a year.

The pasteboard in a small railroad ticket would run a heavy passenger train several times around the globe.

A teacup of water would supply the power of a great generating station of 100,000 kilowatts capacity for a year.

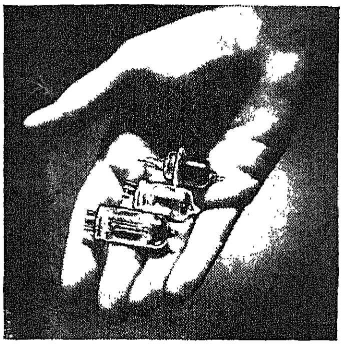
If the atomic energy in matter is made fully available for mechanical use, all other forms of energy would be antiquated, such as fuels and explosives. Dams and electrical transmission lines would be as outmoded as stagecoaches.

These estimates were made before the war (1934) when physicists were just beginning to visualize the tremendous potentialities of atomic research. They were published in *The Advance of Science,* edited by Watson Davis and published by Doubleday, Doran and Company.

Science News Letter, August 18, 1945

Post-war radio "handie-talkies" and "walkie-talkies" will enable you to take your radiophone anywhere you go!

"I'm telling Helen about this—right now!"



RCA miniature tubes—another example of RCA pioneering in radio and electronics. The "handie-talkie" and smaller radios were made possible through the development of these tubes. Moreover, much valuable space can be saved through their use in larger sets.

You're a hundred miles from "nowhere" and you just landed the finest trout in the world! You've simply got to tell your wife (and the boys) back home.

So you turn on your "handie-talkie," signal the nearest "receiving station," get put through long distance and r-r-r-ing!—she's on the other end!

Fantastic? Not at all! For after the war such instruments can be made—about the size of a camera—weighing as little as three pounds—with a range of many miles!

Similar equipment is going to the Allied Armed Forces right now—made possible by miniature electron tubes developed in RCA Laboratories. These miniature tubes are the size of peanuts and acorns! Actually, with these tubes there can be radios the size of a cigarette case or a lady's compact—with "big radio" reception!

Similar research goes into all RCA products. And when you buy an RCA Victor radio, television set or Victrola, you get one of the finest instruments of its kind that science has achieved.

Radio Corporation of America, RCA Building, Radio City, New York 20. *Listen to the RCA Show, Sundays, 4:30 P.M., E.W.T. over the NBC Network.*

RCA RADIO CORPORATION of AMERICA

Do You Know?

Flying insects have descended from wingless ancestors.

Golden eagles are believed to live to be one hundred years old.

Does of the deer family have an alarm call which warns their young to remain quiet.

Water containing one part per million of *iodine* for two weeks each autumn and spring is sufficient to prevent goiter.

Dill is a native of Mediterranean countries, southern Russia, and grows wild in various parts of Africa and Asia.

Mistletoe is a hemiparasite; it has absorbing organs to obtain materials from the host plant, and at the same time has chlorophyll which enables it to manufacture food.

Calcium carbonate, a paint material now generally known as whiting, was used in fresco paintings and stucco work in ancient Rome, and still earlier in Egypt.

Early Greek *painters,* who used only four pigments in color mixing, got better effects than painters in the days in the height of ancient Greek development who used many pigments, according to prominent modern color authority.

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RADIO

Sees Better Than The Eye

Radar development, formerly secret, now revealed in government report on science at war. It adds new dimension to sea warfare, changes "up-sun" advantage.

➤ INSIDE information relative to radar developments, formerly secret but assisting mightily in winning the war, are now revealed, released by the Joint Board on Scientific Information Policy for the Office of Scientific Research and Development, and the War and Navy Departments.

The direction and the range of objects in its field of view are the two basic qualities radar has to offer, the report states.

"The big point about radar is that it can see farther than the eye can, even in the best visibility; and radar's ability to see is relatively unaffected by night, fog, smoke, or rain."

"Radar is the basis of the defense against aircraft attack. This was, historically, its first active role." It alerted ground crews and provided a means of aiming anti-aircraft guns at an unseen target with somewhat greater precision than when visual sighting was relied on.

"Another thing that radar can do and has done is to add a new dimension to sea warfare," the report continues. "It used to be that naval battles were decided by the factor of who happened to be 'up-sun' from the enemy. Now our ships slug through whole engagements in which the enemy may be detected, ranged on, and sunk without a single man having seen him visually."

"Before radar, either of two things could bog down the strategic bombing forces which have been one of our major weapons right through the war," according to the report. "The first was weather at home fields so bad that the planes could not take off or land. The second was cloudy or partly cloudy weather over the target, when the chance of a visual bombing run was too small to justify committing the air force. Base weather, which radar is now helping our planes to defeat, limited operations far less often than target weather did. Now our bombers go out with radar which 'reports' the ground beneath and all around in a faithful and convenient way, emphasizing such features as shorelines, cities, mountains, lakes and rivers."

Not only does radar assist navigation unerringly to the target area, but it also, if target weather precludes a visual bomb run, lines up the target and permits bombing by radar alone.

Successful radio detection was developed independently in America, England, France, and Germany during the 1930's. Back of this discovery lay a half century of radio development in which it was learned that very short radio waves can be reflected, and could be used to detect obstacles in fog or darkness. The fact that radio waves have optical properties—the properties usually associated with visible light—was demonstrated in 1886 by Heinrich Hertz.

"The beginning of interest in radio detection as a military device," the report declares, "can be dated from communications experiments carried on by two civilian scientists working for the U. S. Navy." These two men were Dr. A. Hoyt Taylor and Leo C. Young. In 1922 they observed "a distortion or 'phase shift' in the received signals due to the reflection from a small wooden steamer on the Potomac."

In the summer of 1930, the same men in experimenting with radio direction-finding equipment, made the important observation that reflections of radio waves from an airplane could be similarly detected. The result was the development of a method of detecting the presence of moving objects like aircraft by means of separated sending and receiving stations and the interference of a wave sent directly along the ground and another reflected from the aircraft.

Army officers were shown the Navy equipment in 1930, and in 1932 it was suggested that, as the system could not readily be used on shipboard, that it might be of more value to the Army.

"However," the report says, "the Army carried on developments along other lines which brought about a complete mobile detector at a single site." There has been complete exchange of information between the Army and the Navy in developments.

"Radar was born," declares the report, "when it occurred to different persons independently and in different parts of the world that the pulse technique could be used to detect objects such as aircraft and ships." Scientists in several countries worked secretly on problems of increased power output, shorter pulses, directional antenna systems, and many other practical aspects of the problem.

Robert M. Page, of the U. S. Naval Research Laboratory, was assigned in 1934 to work on these problems. During the next few years he materially assisted in solving in quick succession the difficult problems of generating pulses of the proper length and shape, of building a receiver which would not be blocked by the transmitter pulses and therefore would pick up those extremely short pulses after they are reflected, and of designing cathode ray tube displays for the received pulses.

"The Army's first pulse radar was designed as a complete system at the Signal Corps Laboratories early in 1936," this report states. "By the end of 1936, echoes had been seen from radio pulses directed at commercial planes flying on a regular airway in New Jersey. By May, 1937, a successful demonstration against test bombers was carried on at Fort Monmouth. . . . The equipment not only detected the aircraft but passed an information about their direction, elevation, and range so that searchlights were pointing at precisely the right point when the aircraft came within range."

Science News Letter, August 18, 1945

CHEMISTRY

Toothpaste Tubes Used To Measure Beta Rays

➤ TOOTHPASTE tubes, just beginning to reappear on drug store shelves since their war absence, have been put to a new and unusual use by Burrell W. Brown and L. F. Curtiss of the National Bureau of Standards.

The tubes have been converted by these scientists into Geiger-Muller tube counters for measuring beta rays, one of the three types of rays constantly emitted from radium and other radioactive substances.

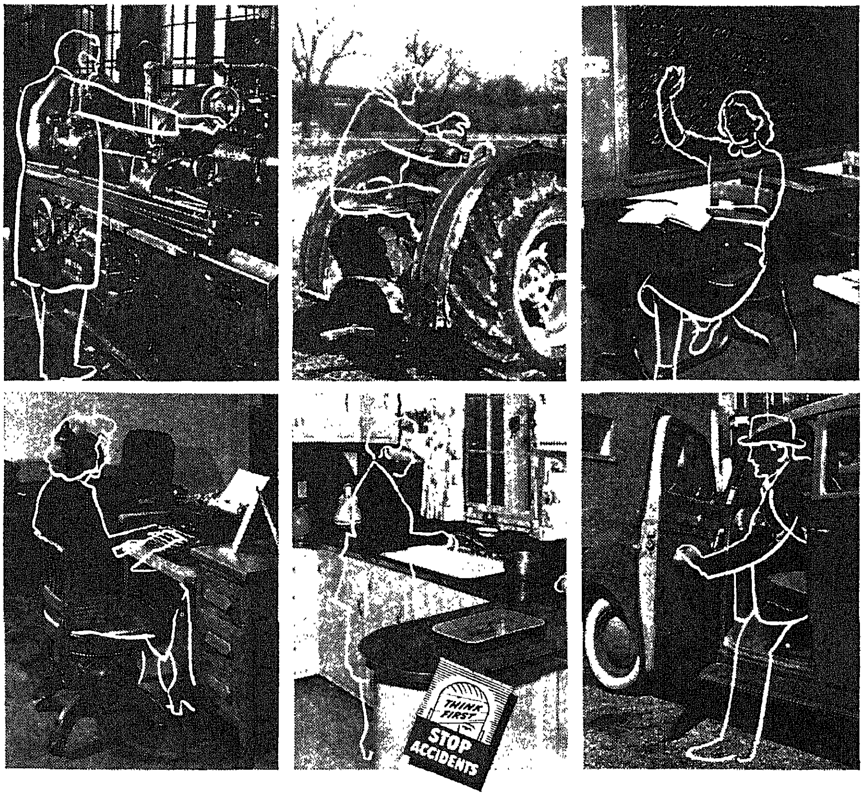
This use was not responsible for the war shortage of toothpaste tubes, however. The Bureau of Standards scientists used the thin-walled, collapsible aluminum tubes now commercially available, not the prewar type usually made of tin and lead.

The Geiger-Muller tube counter consists of an insulated wire mounted axially in a metal tube maintained at a potential several hundred volts from that of the wire. Sensitive to very low intensities of beta radiation, it records each beta particle that passes through it by producing an electrical pulse which can be amplified and registered. Since beta rays with energies as high as 1,000,000 volts can penetrate only a fraction of an inch of ordinary materials, the counter tubes must have walls which are very thin and of low density.

Most previous attempts to develop a suitable thin-walled tube counter have been laborious and expensive since the tube container must be gas-tight. The scientists have been successful in making excellent and relatively inexpensive counters by plating thin layers of copper on commercially available aluminum tubes, and soldering metal plugs in the open ends of the tubes. These plugs support the insulators and glass tube for filling and sealing. The walls are only 4/1000 of an inch in thickness, which permits most beta rays to pass through and be recorded.

Science News Letter, August 18, 1945

The suckers of a *squid* are pneumatic in action, though in some species the hold is strengthened by a ring of hornlike teeth.



Out of action . . . *because they didn't see*

More than 350,000 deaths, 1,300,000 permanent disabilities suffered since Pearl Harbor—more than the total of all casualties caused by enemy action—are *due to accidents* in traffic, at home, on the farm, at work. One reason for this appalling toll on needed manpower is faulty eyesight.

You may have visual handicaps of which you are not aware; or you may have vision ideally suited to certain tasks but not to others. Modern optical science has proved these facts, and has developed scientific techniques for correction of almost all visual defects.

"I didn't see" is a poor excuse for anguish to you or your family. Don't take a chance! Only a professional visual check-up can reveal the true condition of your eyesight.

Think first—stop accidents! Play safe—*be sure your vision is right.* Bausch & Lomb Optical Co., Rochester 2, New York.

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MEDICINE

Gangrene Weapon

Heparin, anti-blood clotting chemical, may become means of preventing loss of limb after frostbite. Already has saved one patient's extremities.

➤ GANGRENE and loss of limbs resulting from frostbite may be prevented by heparin, anti-blood clotting chemical, three New York medical scientists report in *Science* (Aug. 10).

The scientists are Drs. Kurt Lange and Linn J. Boyd, of New York Medical College, Flower and Fifth Avenue Hospitals and the Metropolitan Research Unit, and Dr. Leo Loewe of the Jewish Hospital of Brooklyn.

One frostbite victim has already been saved by heparin from probable "more or less extensive loss of the extremities," the scientists report.

He had been picked up and sent to the hospital after lying at least 14 hours in the street when the temperature was about 18 to 20 degrees Fahrenheit. His hands were bare, his feet protected only by low shoes and thin socks.

When admitted to the hospital his feet and legs were ice-cold up to the knees and remained so for five hours. Heparin was injected into his veins for five days, the clotting time of his blood being kept between 30 and 60 minutes.

"He developed considerable blistering, especially on the hands, but completely escaped any permanent tissue loss," the scientists report.

The use of heparin on this patient followed its trial on volunteers recruited from patients being treated at the Jewish Hospital for a form of heart disease, subacute bacterial endocarditis. Dry ice was put on a small area of skin of the upper arm to produce the experimental frostbite. In one volunteer the dry ice was left on for 30 minutes, producing a temperature considerably under 22 degrees below zero Centigrade, which is about seven degrees below zero Fahrenheit.

This, the scientists state, "is comparable to the frostbite suffered by aviators in high altitude flying, such as nose gunners after demolition of the plexi-glass protection or gunners attempting to unjam guns without glove protection."

Heparin protected the volunteers from serious injury as it did rabbits in still earlier stages of the investigation. It acts by reducing the rate at which blood clots, thus preventing the thrombosis or clot formation in blood vessels which "ultimately leads to gangrene."

The dangerous thrombosis does not occur early in frostbite. First, the scientists found, there is a clumping of red blood cells in the smaller blood vessels, resulting from a loss of plasma through the blood vessel wall.

"The red cells are stranded and silt the blood vessels, forming a sludge," the scientists explain.

After about 72 hours, in the rabbit studies, these stranded red cells organize into thrombi, or clots. Efforts to prevent gangrene after frostbite must obviously be started before this stage of thrombosis is reached, the scientists point out. They are now at work on experiments to find the simplest method of using heparin treatment and the longest interval between exposure and start of treatment which would still be effective.

Science News Letter, August 18, 1945

In Simple Clear Language

Facts about the structure of the atom and the electron theory are contained in two books prepared by Science Service:

FUNDAMENTALS OF ELECTRICITY
By
Morton C. Mott-Smith, Ph.D.

FUNDAMENTALS OF MECHANICS
By
Morton C. Mott-Smith, Ph.D.
and
Marjorie Van de Water

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PUBLIC HEALTH

Protected Bomb Workers

➤ AN impressive array of scientific health watch-dogs, including two nicknamed "Sneezy" and "Pluto" but not otherwise identified, was assembled to protect the health of workers on the new atomic bomb.

The health defenses had two aims: 1. guarding the workers against injury from the peculiar hazards of the enterprise, many of which were entirely new; 2. guarding the secret of the work so vital to national military security.

It was vital that reports of the work not leak out through medical case histories of death or serious injury from radiation, it is stated by Dr. H. D. Smyth, chairman of the department of physics of Princeton University, and consultant to Manhattan District, U. S. Corps of Engineers, in the technical report released by the War Department.

"Sneezy" measured the concentration of radioactive dust in the air. "Pluto" estimated the extent to which laboratory desks and equipment were contaminated with substances emitting alpha particles—usually the new element plutonium.

Pen-like pocket meters were carried by workers to show the daily amount of radiation to which they were exposed. Concealed counters at exit gates to certain laboratories sounded an alarm when someone passed whose clothing, skin or hair was contaminated. Contamination of laboratory coats was checked before and after laundering by instruments, called counters, which detect radiation.

To have healthy workers, the health group worked along three main lines. Prior to employment, a careful physical examination was given each applicant and re-examinations were frequent, particularly of workers exposed to radiation. Only a limited amount of exposure was permitted, a careful check being kept on workers and the plants. The effects of direct exposure of persons and animals to various types of radiation, and of swallowing or breathing the various radioactive or toxic materials with which they

• Books of the Week •

- Air Power For Peace—Eugene E. Wilson *McGraw,* 184 p., illus., $2. Value of air power and its impact upon military and economic security.
- The Basis of Soviet Strength—George B. Cressey—*McGraw,* 287 p., illus., $3. A survey of raw materials, agriculture, climate, industry, and racial backgrounds.
- Carbon Monoxide: Its Hazards and the Mechanism of Its Action—W. F. von Oettingen—*Supt. of Doc.,* 255 p., paper, illus., 35 cents. Public Health Bulletin No. 290.
- Chemistry for Electroplaters—C. B. F. Young—*Chemical Pub. Co.,* 205 p., illus., $4.
- Diet Manual for Home Nursing—Marie V. Krause and Eleanora Sense—*Barrows,* 218 p., $2. Helpful advice on what to do after the doctor has left a diet prescription.
- Industrial Oil and Fat Products—Alton E. Bailey—*Interscience,* 735 p., illus., $10. A text on oil and fat technology.
- Intelligence And Its Deviations—Mandel Sherman—*Ronald Press,* 286 p., illus., $3.75. Psychology Series. Medical, psychological and social aspects of the subject.
- Keep 'Em Rolling: A Driver's Handbook—Richard Gordon McCloskey—*Infantry Journal,* 279 p., illus., paper, 50 cents. 6th ed., revised and enlarged. A handbook for the Army driver.
- Medicinal Products, United States Equivalents And Alternatives: Alkaloids, Biologicals, Chemicals, Glandular Products, Pharmaceutical Specialties, Vitamins—George R. Tompkins and S. N. Samuelson—*Supt. of Doc.,* 107 p., paper, 50 cents. Industrial Series No. 11. Text in English, Spanish and Portuguese.
- Plastics: A Simplified Presentation of the Important Plastics Materials and Products with Tables of their Properties and the Basic Design Information Required by Engineers and Designers—J. H. DuBois—*Am. Tech. Soc.,* 447 p., illus., $4. 3rd ed., revised and enlarged.
- The Story of Blue Cross: On the Road to Better Health—Louis H. Pink—*Public Affairs Committee,* 31 p., illus., paper, 10 cents. Public Affairs Pamphlet No. 101.

Science News Letter, August 18, 1945

From page 110

worked were carefully studied. Even the smoke from the stacks was investigated for dangerous gases.

The workers were shielded by air-tight walls of concrete, steel or other absorbing materials from the radioactive elements. Uranium was even loaded and unloaded by remote control. High stacks were built to carry off the radioactive poisonous gases along with the acid fumes. Most of the time the carefully-protected operators had nothing to do except record the readings of various instruments.

The chief way of determining if a person was suffering from overexposure to radiation was the white blood cell count. Individuals affected were shifted to other jobs or given brief vacations; none have shown permanent ill effects, Dr. Smyth said.

"Film badges" were introduced by the health division to check on the conditions under which the people worked. Small pieces of film, worn in the identification badge, were periodically developed and examined for radiation blackening.

Pocket meters were also developed to show the extent of exposure. The first was a simple electroscope about the size and shape of a fountain pen. The meters were electrostatically charged at the beginning of each day and read at the end of the day. The degree to which they became discharged indicated the total amount of ionizing radiation to which they and the carrier had been exposed.

Science News Letter, August 18, 1945

CHEMISTRY

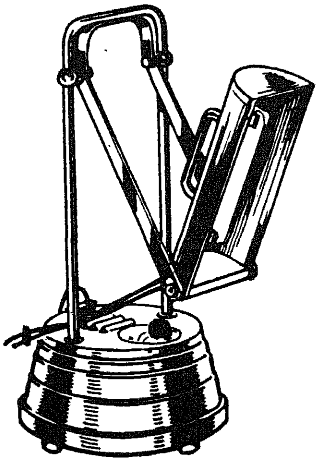
New Method Offered For Desalting Oil

➤ SALT, any experienced oil man can tell you, is one of the most ruinous impurities you can have in petroleum. To get rid of salt in oil in which it is present in practically dry, microcrystalline form along with organic acids, G. S. Nees of Ft. Worth and R. B. Perkins, Jr., of Houston, have devised a process on which they have received patent 2,380,458. They introduce water containing sufficient alkali partially to neutralize the acid, and agitate the oil until it is in an emulsified state. Then it is exposed to an electric field that causes the salt-containing droplets to coalesce, making their elimination easier.

Science News Letter, August 18, 1945

Eight or more sprayings of *apple orchards* are now required to accomplish the results of a single spraying 40 years ago; the coddling moth of today is the descendant of the worms that proved best able to resist poisoning in the past.

It is important in curing *hay* to save the leaves, as they contain more feeding value than the stems; alfalfa leaves, for example, have twice as much protein, calcium and phosphorus as the stems.



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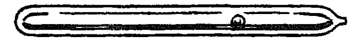


Sun-Kraft, "No filament, burn-out-proof" super transparent quartz tube can not burn out, can not fog, develop black spots or weaken in ultraviolet radiation. Costly replacements are entirely eliminated.

Conventional type electrode or filament activated tube. Deteriorates quickly because of the fused in metal. It will develop black spots fast, reducing ultraviolet radiation and eventually burning out entirely, necessitating costly replacements.

SEND FOR FREE ILLUSTRATED BOOKLET "HOW TO USE YOUR SUN-KRAFT"

New Machines and Gadgets

⚙ *UNDER-PILLOW speaker, a flat miniature device to enable individual hospital patients to hear radio programs without disturbing others, contains a crystal drive-element and a plastic diaphragm. The case, hermetically sealed, may be dipped without injury in disinfecting solutions.*

Science News Letter, August 18, 1945

⚙ *POWDER PUFFS of synthetic rubber, in pastel shades, will soon replace natural rubber puffs. The foamed latex resists deterioration from natural skin oils and from greases in cleansing creams. One kind will have materials of different porosity on the two faces and a powder magazine in the center of each puff.*

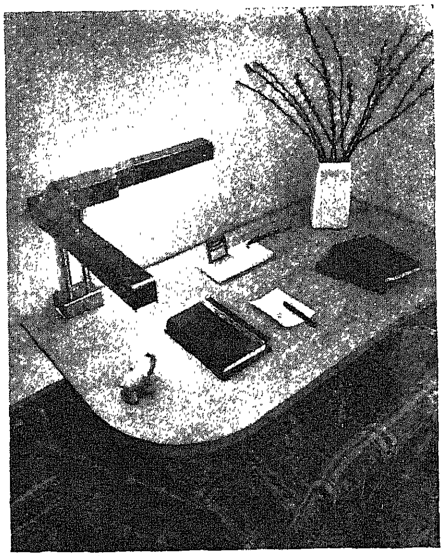
Science News Letter, August 18, 1945

⚙ *SPARE WHEEL and tire carrier for heavy trucks is attached under the center of the vehicle on a pivoted arm and platform so that it can be swung outward to the side of the truck. A pivoted holder at the outer end of the carrier permits the driver to roll the tire up to or away from its carrying position.*

Science News Letter, August 18, 1945

⚙ *NUTCRACKER, which resembles the ordinary tool composed of two handles hinged at one end, has three separated cavities between the jaws for different-sized nuts. The largest cavity, designed for English walnuts, has a special recess for their projecting ridges.*

Science News Letter, August 18, 1945



⚙ *DESK LIGHTING unit for lamps of the fluorescent tube type has two arms swiveled to turn 90 degrees, shown in the picture, so that the unit may be used on either side of the desk with the lamps in any position. If desired, the two arms can be turned to extend lengthwise against the wall.*

Science News Letter, August 18, 1945

⚙ *WALLPAPER-REMOVING device is composed of a steam pan, supported on a stand on casters, with a perforated outer face that may be placed against the wall. Steam is delivered to the pan through a flexible hose, and the pan is raised or lowered by a handle on the telescoping upright of the stand.*

Science News Letter, August 18, 1945

⚙ *ARTIFICIAL TEETH, which under pure ultraviolet light appear as gaps between the natural vital teeth, will glow like natural teeth if a bit of a tasteless metallic salt of quinine is mixed in the porcelain or acrylic resins of which the tooth is made. The salt adds fluorescence to the material.*

Science News Letter, August 18, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 272.*

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Question Box

BOTANY

Under what conditions can mushrooms live to be 35 years old? p. 104.

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What is the latest gangrene weapon? p. 110.

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How were the atomic bomb workers protected? p. 110.

Where published sources are used they are cited.

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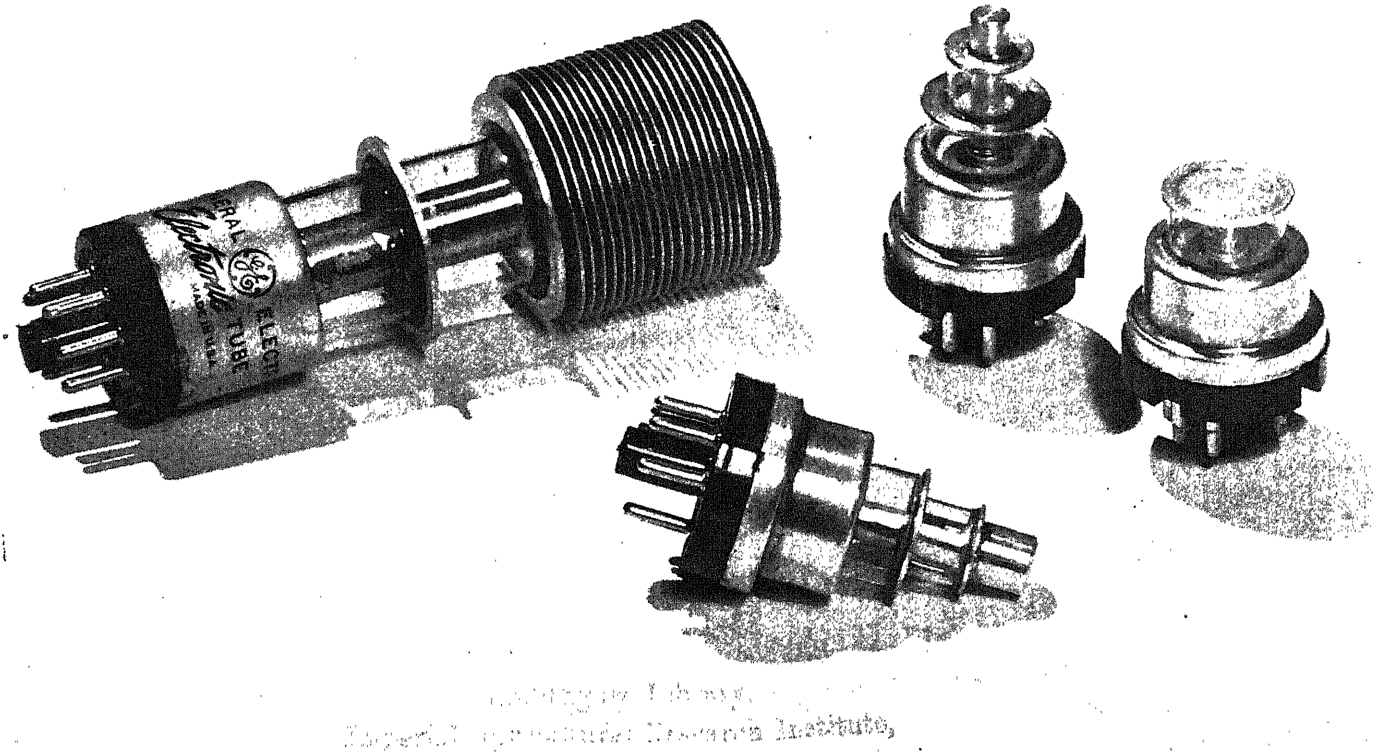
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • AUGUST 25, 1945



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Imperial Agricultural Research Institute,
New Delhi.

Mighty Midget
See Page 120

A SCIENCE SERVICE PUBLICATION

PUBLIC HEALTH

New Polio Weapon

DDT is sprayed from airplane on Rockford, Ill., as a possible aid in fighting an outbreak of disease in that city. May provide evidence of carrier.

➤ NEW development in the application of aviation to sanitation and public health is hinted in the use of a B-25 to spray DDT on Rockford, Ill., as a possible help in fighting an infantile paralysis outbreak in that city.

So far as infantile paralysis goes, this spraying of the potent insecticide by air and the use of DDT by power sprayers from an Army truck are in the nature of trial balloons. Dr. John R. Paul, of Yale University and some other scientists have for some years suspected that the common house fly might spread the infantile paralysis virus.

The virus of the disease has been found in flies, but whether the disease actually is spread by them has not yet been proved. Through the Army's Epidemiological Board and the Air Surgeon's Office, the plane from Wright Field and Army DDT power sprayers and men who know how to use the latter have been ordered to Rockford for the trial. The power sprayers will be used on fly breeding places on the ground, while the plane presumably will be used to distribute DDT where the power sprayers cannot reach.

If, at the same time or immediately after killing off all the flies in Rockford, cases of infantile paralysis drop sharply, it will be further evidence in support of the theory that flies spread this disease. The matter of timing will prove important, since the test would not be valid unless a full-blown outbreak was in progress and also would not be valid if the outbreak had progressed so far that cases would be falling off anyway.

Regardless of how the polio trials go, they seem to herald the beginning of rather extensive domestic use of DDT against flies and mosquitoes that endanger health or are a mere nuisance.

Science News Letter, August 25, 1945

AERONAUTICS

German Work Captured

Enemy research in field of jet-propulsion was revealed by surrender intact of factories and working drawings. Gas turbine and rocket both successful.

➤ GERMAN activities in building jet-propelled planes, particularly during the last 18 months of the war, and the details of these fighters, are no longer secrets, as many underground factories in which they were constructed were captured intact by the Allies. Plans and working drawings collected since VE day reveal that German scientists had long been interested in jet propulsion, both of the turbine-jet plane and the true rocket-propelled plane.

An experimental turbine-jet plane of German origin was flown in August, 1939, according to *Flight*, a British aviation journal. Its success led to further developments.

"The Germans were quick to recognize the possibility of speedy production offered by the simple gas turbine," the journal states, "and consequently, when they were forced on to the defensive by our bombing attacks, there was concentration upon jet fighters and reconnaissance types.

"The Germans also successfully developed a true rocket-propelled plane, the Me 163, which was extremely fast—faster indeed than the turbine-jet plane," the English publication continues. "This liquid rocket-propelled fighter which had a vertical fin only and no elevators—virtually a tailless type—was credited to Lippisch, who produced before the war a series of Delta machines of somewhat similar design but fitted with reciprocating engines."

German turbine-jet planes went into service on the Western front in the summer of 1944. At about the same time the British Gloster Meteor fighters with two Whittle-type jet units were coming into combat service. There is no record of jet fighter meeting jet fighter

ber of German jet planes were shot down over the Western front.

Captured Heinkel-Hirth engines, used in some of the German jet planes, were regarded as unduly heavy and not outstandingly efficient, according to *Flight*: "Their 'overhaul' life is reported to be quite short—less than 25 hours—which contrasts with the 250 hours' overhaul life of a modern reciprocating type aircraft engine. Whereas turbines by comparison are more simple to service and maintain, the Germans do not appear to have taken advantage of this basic fact." They relied on replacements.

The British now have a jet-propelled plane, the de Havilland Vampire, capable of over 500 miles an hour. The American Army has recently revealed details on its new P-80 Shooting Star, which has a speed of over 550 miles an hour and is probably the fastest plane in existence.

America's active wartime interest in a jet-plane for fighting and other purposes may be said to date with the sending of an Army engineer, Col. Donald J. Keirn, to England in June, 1941, to get such information as possible on European developments. One result was the bringing of Frank Whittle, the English designer of the Whittle-type jet unit, to this country in May, 1942.

Previously, however, Col. Keirn had sent to Washington working drawings and information assembled by him. On Sept. 4, 1941, Bell Aircraft and General Electric engineers were asked to design and set up production of the Army's first jet plane. The first successful test run of the General Electric Whittle-type engine was in March, 1942. It was an improved model.

While General Electric was working on the engine, Bell Aircraft was designing and constructing an airframe. By October, 1942, the XP-59 twin-jet Airacomet had been shipped to a test base in California, the engines installed, and the plane prepared for its first flight.

Test flights showed that the small power units in this first plane limited its performance to that already obtained by conventional aircraft. General Electric set out to develop a larger and more powerful engine resulting in the power unit in the P-80. Earlier jet models have been relegated to the status of training craft.

Science News Letter, August 25, 1945

Shallow *cultivation* of the garden soil kills weeds that take both plant food and moisture needed by the vegetables; it also makes a dust mulch that lessens

ELECTRONICS

Radar Secrets

Small tube used in instrument develops much more power than broadcast transmitters. Solutions of other research problems revealed.

➤ THE SMALL tube used in radar is the source of stupendous power. This tube may develop as much as hundreds of thousands of watts, as compared with the most powerful transmitter used for radio broadcast, which is limited to 50,000 watts.

The power must be applied in a burst for only a millionth of a second and then turned off completely to wait in repose for the echo to come back.

Development of this oscillator tube is termed a major achievement of the radar art by the official announcement issued by the Joint Board on Scientific Information Policy. The tubes used before the war at radar frequencies could develop only a few thousandths of a watt.

The receiver, which must be sensitive enough to pick up the tiny echo bounced off a distant ship or plane, must be protected against the terrific power burst of the transmitter, which would paralyze it or burn it out completely.

Transmitter and receiver are built in one box and operate on one antenna. This is really necessary because the directional antenna acts as a "searchlight" sending the signal out and as a "telescope" in picking up the echo. Naturally, both searchlight and telescope must be aimed in the same direction. This is sure when one antenna is used for both purposes.

But use of one antenna requires that the receiver be disconnected when the antenna is sending out the burst of power. The means for doing this was a particularly difficult piece of development, details of which are still not revealed.

Not only is it necessary to disconnect the receiver while the transmitter is working, but within a millionth of a second later the receiver must be open to receive the faint echo and the transmitter must be closed off so that it will not absorb any of the weak incoming energy.

To carry the energy from the radar transmitter to the antenna, ordinary wires and coaxial cables are unsatisfactory. For the microwaves used in radar, it is more efficient to use wave guides, which are really carefully proportioned hollow pipes known to radar men as "plumbing." For certain of the equipment these wave guides may look like rectangular rainspouts. The high frequency currents from the transmitter are converted into electromagnetic radiation at the bottom of the pipe and guided through the pipe by successive reflections from the inside surface.

The problem of the antenna design was also a major one. It had to be highly directional. This can be done either by building it up of an array of small antennas, or by using the searchlight principle of spraying the energy into a large parabolic mirror which focusses the energy into a beam. In either case, the larger the antenna, the sharper the beam, but it can be made small enough to go on an airplane.

To use the radar to search the whole expanse of sea and sky, the antenna is turned, swung around or up and down to direct the beam in the various directions.

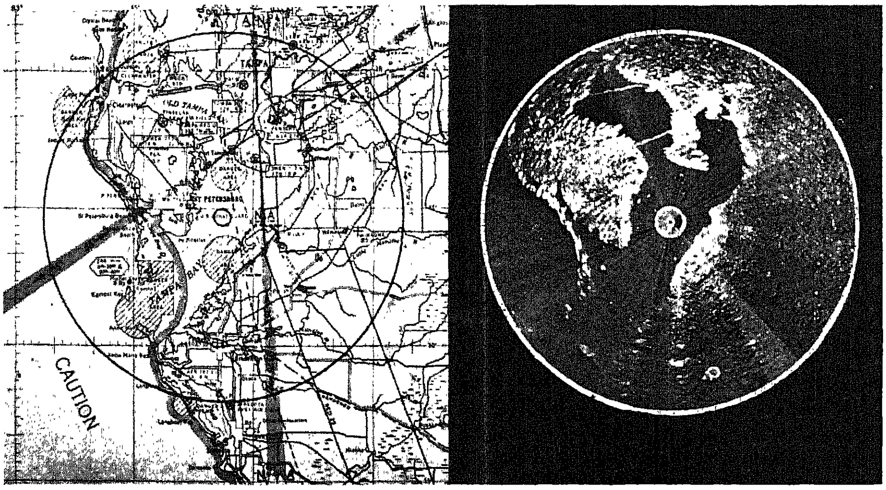
What the radar picks up is shown to the operator on a television-type screen. In the simplest type, an electrical mechanism causes a spot of light to trace a line across the screen at a uniform speed. The spot starts at one side at the instant the transmitter goes off. Whenever an echo comes in, the spot gives an upward bounce or "pip." The distance of this pip from the starting point gives the time required for the echo to return and therefore the distance of the ship or other target.

A target 1,000 yards from the radar will give a pip only six millionths of a second later than the transmitted pulse.

It is possible to set up the radar system to see all directions on one screen, with any ships and the shoreline appearing as in a map with the radar operator and his ship in the center. This is done by rotating the whole antenna system from one to 20 times a minute, scanning the whole horizon.

In this case, the dot of light starts from the center and moves outward in a direction corresponding to the direction of the antenna. Each echo, instead of making a pip, makes a bright spot of light, indicating both the direction and the distance of the ship that reflected it. The screen thus is an accurate map showing the positions of all the surrounding ships. The radar operator can, in fact, watch the shells move across the screen toward the target pip, and can even see the splashes they make when they hit the water.

An incident quoted in the official report tells of the commodore of a destroyer force who was watching the radar screen. It was a spectacular battle with blazing Japanese ships. *(Turn page)*



RADAR BOMBSIGHT—At the left is an ordinary air navigator's chart of Tampa Bay, Fla. At the right is the same "target" as seen on the radar bombsight screen. The straight lines across the water near the top of the picture are bridges and causeways. The small white dots show how boats and ships look to the radar eye. Notice how clearly land and water masses are distinguished.

"Come up here, for the sight of your life!" the captain called down to the commodore.

"No thanks," replied the commodore, "I can see better from here."

Science News Letter, August 25, 1945

MEDICINE

Water Spreads Hepatitis

First experimental evidence shows that the infectious liver disease is acquired in this way. Gamma globulin from blood gives protection.

➤ FOR apparently the first time, medical scientists have experimental evidence that infectious hepatitis spreads through contaminated drinking water. This is an inflammatory liver disease sometimes accompanied by jaundice which became widespread among both civilians and military forces during the war.

With this medical first comes also the first satisfactory evidence that a virus disease can be naturally acquired by humans through water.

Studies showing these facts are reported in the *Journal of the American Medical Association* (Aug. 11) by Capt. John R. Neefe, of the Army Medical Corps, and Dr. Joseph Stokes, Jr., of Philadelphia.

Gamma globulin from human blood, which is used to give protection against measles, will also protect against this infectious hepatitis, it was found in trials during an epidemic in a heavy bombardment group and various regiments of the ground forces in the Mediterranean Theater last winter. These trials are reported in the same issue of the medical journal by Dr. Stokes and Capt. Sydney S. Gellis, Maj. George M. Brother, Maj. William M. Hall, Col. Hugh R. Gilmore and Maj. Emil Beyer of the Army Medical Corps and Capt. Richard A. Morrissey of the Army Sanitary Corps.

Tests of gamma globulin as a protective against infectious hepatitis in the armed forces followed a test of the material by Dr. Stokes and Capt. Neefe during an outbreak of the disease in a camp for boys and girls last summer. The discovery that the virus causing the disease could be spread through contaminated water was made in further studies of this same epidemic. The water became contaminated through intestinal wastes from infected persons.

Chlorination of drinking water according to procedures commonly used for rapid disinfection under emergency conditions did not inactivate or weaken the virus, Dr. Stokes and Capt. Neefe found in studies made with Maj. James B. Baty, of the Army Sanitary Corps, and Dr. John G. Reinhold, principal biochemist of the Philadelphia General Hospital.

"Superchlorination" of infected water definitely reduced the ability of the virus to cause disease. Treatment of contaminated water with sodium carbonate and aluminum sulfate, used to remove extraneous material from drinking water by coagulation, and activated carbon, also used to remove materials from water, did not completely remove or inactivate the virus or germ of infectious hepatitis.

Methods used to disinfect water, the scientists report, may have to be modified further in order to inactivate completely the germ that causes infectious hepatitis.

Human volunteers had to be used for the studies, since there is no way of knowing whether the virus of the disease is present in a given material except by demonstrating the ability of that material to produce the disease in humans. Conscientious objectors and members of the Civilian Public Service Unit 140 of Philadelphia were among those volunteering for the studies. Besides drinking suspected and known to be infected water, these volunteers had blood serum, nose and throat washings and material from body wastes of patients given them, in order to learn how the germ spreads.

All the studies were carried out under the direction of the commission on measles and mumps of the Army Epidemiological Board.

Science News Letter, August 25, 1945

CHEMISTRY

Excelsior Planks for Your Postwar House

➤ THAT NEW house you are going to build now that the war is over may be made of excelsior instead of solid boards and planks sawed out of big logs. A process for making planks out of excelsior and Portland cement has been patented by Armin Elmendorf of Winnetka, Ill.

The excelsior, which may be made from such cheap, low-grade timber varieties as cottonwood or aspen, is first immersed successively in sodium silicate and calcium chloride. These chemicals react together to precipitate calcium siliate on the fibers; common salt, the other product of the reaction, is removed by washing. The excelsior is then mixed with a concrete slurry, molded to the desired dimensions, cured for a suitable period in a moist room, and set aside to dry.

Rights in Mr. Elmendorf's patent, No. 2,377,484, are assigned to the Celotex Corporation.

Science News Letter, August 25, 1945

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ELECTRONICS

How Radar Saved England

It detected hostile warships from aircraft, warned of the approach of enemy aircraft, and defended harbors and coasts against small enemy vessels.

➤ HOW RADAR saved England from Hitler in the 1940 Battle of Britain and later from rocket bombs, the close co-operation of Great Britain and the United States in the development of radar even before Pearl Harbor, and the part played by radar in the air forces, on shipboard, and particularly in clearing the Atlantic of Nazi submarines, are revealed by the British Information Services.

The detection of hostile warships from aircraft, the warning of the approach of enemy aircraft, the defense of harbor and coasts against small enemy vessels, the feeding of gunnery data to predictors from "radiolocation," or radar equipment, the control of searchlights to illuminate aircraft targets, all these, the report states, were accomplished facts by the outbreak of the war in September, 1939. Outstanding improvements were, of course, made later.

The Battle of Britain, in 1940, was the turning point in the war, and it was the highly advanced system of coastal radar stations, begun in 1935, that made the victory possible, according to the report. These stations covered the east and south coasts of England. The Germans were unaware of their scope and accuracy. Nazi bombers taking off from France were watched by English radar throughout their entire flight no matter how roundabout their route. The advance information relative to the size of Nazi air squadrons and their routes is responsible for their defeat.

As the science of radar advanced, it was found possible to design complete stations so small that they could be fitted into an aircraft. They were at once installed in night fighters with such immediate success that within a few months the Luftwaffe was forced, in May, 1941, to discontinue the London blitz.

Before the Battle of Britain, the English Army and Navy, as well as the R.A.F., saw the importance of radar and set up research to find how it could be adapted to their particular needs. The Royal Navy began by using radar as an air-warning device but quickly found that as a method of range finding and gunlaying it was without a rival. Compact radar sets for gunfire control have been in British naval ships since 1940, and contributed greatly to their successes.

Robot bombs from the mainland coast directed on London were conquered largely by radar. "One of radar's most uncanny developments," the report declares, "a gun which aims itself and follows a moving target automatically and unerringly, was the climax, in 1944, of the British Army's research into radar applications.

"This British invention was incorporated into United States equipment, and quantities were manufactured and shipped to Britain, just in time to shoot down 80% of the flying bombs which were destroyed by anti-aircraft batteries."

A radar set called A.S.V. (air-to-surface vessel), which showed the presence of shipping, was installed in aircraft in 1939. Early in 1942 a version of A.S.V. was introduced which was capable of detecting surfaced submarines. This eventually robbed the commanders of these vessels of immunity from aerial attack at night when they were accustomed to surface. This equipment helped win the Battle of the Atlantic.

While the report claims for England the first operational system of radar to be installed in the world, that is, the detection towers installed along the coast, it gives credit to America for her independent development of radar, and particularly for her mass production of American, British, or cooperatively designed equipment.

In August, 1940, at the very moment when radar was proving its supreme value in the Battle of Britain, a small group of British scientists arrived secretly in Washington with complete plans of existing equipment and proposed equipment not yet fully developed. From that time on there has been a full interchange of information and research and the closest collaboration in development.

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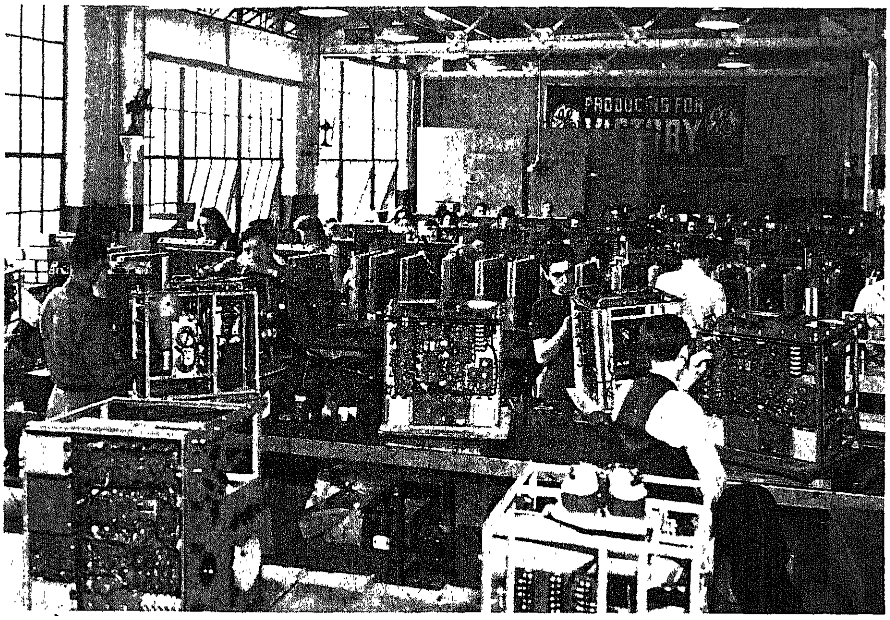

RADAR MANUFACTURE—This is the way those super-secret radar factories looked. Here the equipment is being assembled in a General Electric plant for use in the U. S. Navy. Notice that the large tube which acts as electronic eye for the set is visible in side view in the set being handled by the worker at the left. The face of the tube shows in the set in the left foreground.

PUBLIC HEALTH

Mortality in Childbirth Cut by One-Third

➤ THE CHANCE that a mother will live to enjoy the child she brought into the world is continually improving. The mortality of women giving birth to children was cut by more than one-third in the United States during the first three years of this decade, areas with the worst records showing the greatest improvement. Only 20 white mothers per 10,000 live births died in 1943 and 51 colored mothers per 10,000 for the same year.

In 1940 maternal mortality in the white population ranged from a high of 39 per 10,000 live births in the East South Central states, to 27 in the Pacific states, census figures show. The difference between these rates was nearly halved by 1943, when the rate for the East South Central states was 25 per 10,000, while for the Pacific states it was only 18.

Closely associated with the unfavorable record for the East South Central states, point out statisticians of the Metropolitan Life Insurance Company, is the fact that only 43% of the confinements were attended by a physician in a hospital, a percentage smaller than for any other area. In the Pacific states, where the maternal mortality was lowest, 95% of the women gave birth to their babies in a hospital.

For the country as a whole, maternal mortality among the colored was fully 2½ times as high as that for the whites. Whereas 77% of the white births were hospitalized, only 33% of the colored were so cared for. In the East South Central states only 12% of the confinements were hospitalized, as few as 28% had the care of a physician in the home and 60% were attended by a midwife. In contrast to this, in the New England states 88% of the confinements among the colored were in hospitals and 12% had medical attention at home.

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PHYSICS

Atom No Longer Unknown

Only a half century ago, it was believed to be minute but solid "chunk" of matter. Complex structure gradually disclosed to physicists.

➤ IF THE atom has seemed a mysterious and theoretical commodity up to now, it is so no longer. It has landed in our thought, literally like a bomb-shell. What is this atom which the physicist splits, and how does he do it?

Until shortly before the year 1900 it was purely an academic question whether matter—a lump of coal or a quantity of air—could be divided and subdivided forever, or whether, eventually, a bit would be found so tiny that to divide it would be to destroy it, or at least to change it into something different. The mind prefers the first theory, for the imagination sees each of the halves of the divided piece looking much like the original. The boundary where this no longer holds true is outside the conditions of our experience.

But chemists, who had been studying the way substances combine, had long believed that they could explain the way combinations take place only by assuming units of each material. If water is always composed of twice as much hydrogen as oxygen, as they found to be true when they weighed the materials, then it seems obvious that, divided small enough, the ultimate drop of water will be reached. This ultimate drop the chemist calls the molecule. He believes it is composed of one atom of oxygen and two atoms of hydrogen. Divide it, and you no longer have water, but only the atoms composing it.

The indivisible atom was enough to explain chemical reactions. There was no need to inquire into its constitution until the turn of the century, when the discoveries of radioactivity and X-rays posed problems that could be answered only by supposing that the light that made the new chemicals shine and the radiations that fogged photographic plates must come from the structure of the atom itself.

The amazing new science of atomic physics grew out of the study of these new and unsuspected properties of matter. As one set of new properties was tagged as belonging to the nucleus of positive electricity which seems to hold the atom structure together, and another as due to the planetary electrons which can be pictured as circling around it, the image of the atom as a miniature solar system developed.

Studying the radioactive elements, radium, uranium, thorium and the similar short-lived ones that exist temporarily as their disintegration products, scientists found them to be giving off three different kinds of rays, which they named for the first three letters of the Greek alphabet. The alpha rays are composed of a stream of nuclei of helium atoms, the first recognized case of one element appearing as a disintegration product of another element. Alpha rays travel with such enormous energy, compared with their size, that they seem usable as a source of useful work. Beta rays are composed of electrons, not matter at all, but units of electricity. Gamma rays are like light waves and X-rays.

Since these rays given off by forces within the atom are among the very few materials in the universe comparable in size to the atom, physicists thought of using them as tools for experimenting with atom structure. In 1919 Sir Ernest Rutherford shot streams of helium nuclei, the alpha rays, through oxygen, nitrogen and other common gases and succeeded in getting some of the particles to collide with the central part of an occasional atom. While he could not see the particles, he could make them take their own pictures of the luminous trails they left behind them.

After the method of observing atom-trails had been worked out, physicists were able to use it and developments of it to learn what happens when atom "bombardment" is tried under various conditions, and how the number of "hits" can be increased. Ways to speed up the bombarding particles were learned. The greater the speed, the more hits there were recorded.

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ENGINEERING

Shipping Vegetables in Snow-Ice Keeps Freshness

➤ VEGETABLE produce shipped bedded down in finely granulated ice keeps its freshness, crispness, and vitamin C content over a longer period, researches conducted in 21 colleges throughout the country have shown.

"This method of refrigerating produce with snow-ice is like the protective effect of the late spring snows on vegetation," Charles F. Belshaw, research consultant of the National Association of Ice Industries, said, speaking as guest of Watson Davis, Science Service director, on the CBS program "Adventures in Science."

Researches show that vitamin C retention in foods is essential in the retention of flavor and that keeping vegetables fresh through use of snow-ice will bring food to the dinner table so that it tastes better and is nutritionally better.

Whole blood was shipped successfully across the Pacific in an insulated container in which the bottled blood is placed in racks around a large compartment of cracked ice, Mr. Belshaw said. Although temperatures inside planes in the Pacific often go as high as 130 degrees, this method keeps the blood to be used in treating the wounded at a temperature between 40 and 45 degrees which is necessary to keep it in usable condition.

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PHYSICS

Atom Force Due to Brisance

The suddenness of change from solid to gaseous state is responsible for the explosive force which makes the new atomic bomb the most terrible weapon yet devised.

➤ THE EXPLOSIVE force which makes the new atomic bomb the most terrible weapon man has yet devised for his own destruction comes from sudden release of energy. In most explosions energy makes itself known as heat and as shattering of nearby objects, caused by expansion of hot gases. This suddenness in release of power, known to explosives experts as brisance, depends largely on the speed with which the reaction takes place. Nitroglycerin has more brisance than gunpowder because it burns so much faster.

The new bomb is known to be powered with atomic energy. The feature of atomic energy which makes it a promising field for research is that, although the amounts of material available for use in the whole world are very minute, the amount of energy they can release is relatively enormous.

Conventional explosives are chemicals which burn very quickly, forming products which are wholly gases. These gases expand very fast in the heat their burning generates. They do not depend on air for their combustion. They carry in their own formulas the proper kinds and amounts of chemicals to form destructive masses of expanding gas, which push everything out of their way. They have to be mixtures which are relatively safe to handle, but which let go with a bang when set off by a detonator. The detonator supplies the margin of extra energy necessary to start the reaction.

Explosions due to sudden firing of small particles, like the dust and chaff in grain elevators, no less than those caused by explosives of the ammunition type, result in waves of hot gases. When confined in small space, these gases expand in every direction, and any part of their surroundings that can be moved is thrown or shattered violently by the blast. Dust is explosive because the large surface of its fine particles makes contact with plenty of oxygen in the air to burn it. Any chance spark can set it on fire.

Not all explosions result in release of energy. An overheated steam boiler explodes because the pressure of the gas inside has become greater than the walls of the boiler can support. The escaping steam becomes cooler, as contrasted with the hot combustion products of the dust and ammunition types. But whatever the cause, the shattering effect is capable of doing great damage.

Judging from the reports of the experimental explosion in New Mexico, both the brisance and the heat developed by the atomic power bomb are tremendous. If the steel tower which is reported to have disappeared is not found far away in the form of twisted scrap, or a melted puddle of iron at the site where it stood when the experiment started, it must be presumed to have vaporized. This would indicate temperatures hotter than 3,000 degrees Centigrade, or 5,400 degrees Fahrenheit. Astronomers are more familiar with temperatures in this range than are furnace men who work with molten earth materials. At even half that temperature, around the melting point of iron, life would vanish instantly in a puff of smoke.

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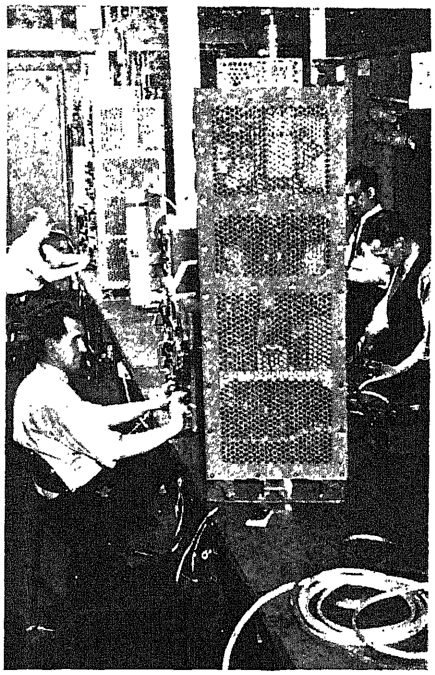

TESTED—The radar transmitter set up for testing in a General Electric plant.

POPULATION

Small Town Girls Likely To Marry in Their Teens

➤ GIRLS living in small southern towns in the United States are most likely to marry before they are 20; those living in large northeastern cities are least likely to marry young.

One-ninth, or 11.1%, of the native white girls between the ages of 15 and 19 were married at the time of the 1940 census, the Metropolitan Life Insurance Company points out in its statistical bulletin. In the South, 18% of the young girls of the region were married before they were 20, and 20.6% of the girls in communities of less than 2,500 inhabitants.

In the larger cities only 6.3% of the girls from the ages of 15 to 19 were married, while in the smaller towns and villages throughout the country 15.1% had been married. The farther west a young girl goes along the northern tier of the country, the better appear to be her chances for early marriage.

Although girls in our small towns and villages may have a better chance for early marriage than those in large cities, figures of the U. S. Bureau of the Census show that the probability of eventual marriage is greatest for those who remain on the farm.

Girls in the West have a better chance of eventual marriage than girls in other sections of the country, irrespective of whether they are living in cities or whether they have remained on the farm.

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Frogs croak mostly during the breeding season.

Metallic salts of *quinine,* added in tiny quantities to materials used in artificial teeth, give them fluorescence and make them glow under ultraviolet light similar to natural teeth.

PHYSICS-NAVIGATION

Electronic Navigator Is Adaptation of Radar

➤ AN ELECTRONIC NAVIGATOR for ocean, lake and river ships, that will detect by radar above-water obstacles such as other vessels, icebergs, land, lighthouses and buoys, is under test on shipboard by the U. S. Maritime Commission, it is now announced. It will detect these obstacles through darkness, fog and storm at distances up to 30 miles, depending on the size of the object.

The tests are being made on the SS American Mariner, training ship of the WSA's Maritime Service training program. Additional sets will be placed soon on other vessels. When materials are available the equipment will be obtainable by commercial shipping, both on inland waters and on the sea.

The device operates on the radar principle of radio waves which are reflected from objects and are measured to give true bearing and distances of the object from the point of sending. It has a rotating antenna, located on top deck of the vessel, sending out powerful radio micro-waves capable of penetrating fog or other atmospheric conditions. If these pulses hit an object, some of them are reflected back to the rotating antenna, which also contains a receiving antenna.

The apparatus is an adaptation of radar equipment that has served a valuable war purpose. The set under test was developed by the General Electric Company laboratories at Schenectady, N. Y.

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ENGINEERING

"Canning" Uranium Slugs Difficult Bomb Problem

➤ HOME CANNERS preserving the harvest of their Victory Gardens who may have an occasional failure don't know what real canning problems are. Learning how to "can" uranium slugs was one of the most difficult problems encountered in making atomic bombs, Dr. H. D. Smyth, of Princeton University and consultant on the project, relates in the technical report released by the War Department. The failure of a single "can" might have caused an entire operating unit to be shut down.

The most efficient way of cooling the uranium would have been to let the water flow in direct contact with the radioactive metal in which the heat was being produced. This seemed out of the question, however, since uranium would react chemically with the water. It was feared direct contact between the two would put a dangerous amount of radioactive material into solution and probably even disintegrate the uranium slugs.

No one who lived through the period of design and construction of the Hanford, Wash., plant is likely to forget the problem of sealing the uranium slugs in protective metal jackets, states Dr. Smyth. The state of the "canning problem" could be roughly estimated by the atmosphere of gloom or joy to be found around the laboratory.

A sheath had to be found that would protect uranium from water corrosion, keep fission products out of the water, transmit heat from the uranium to the water and not absorb too many neutrons.

Metal jackets or cans of thin aluminum were feasible from the nuclear point of view and were chosen early as the most likely solution of the problem, but alternative ideas continued to be explored. Both the problem of getting a uniform heat-conducting bond between the uranium and the surrounding aluminum, and that of effecting a gas-tight closure for the can proved troublesome.

Even up to a few weeks before it was time to load the uranium slugs into the pile there was no certainty that any of the processes under development would be satisfactory. A final minor but apparently important modification in the canning process was adopted in October, 1944, and up to the time of the report there had been no canning failures.

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INVENTION

New Milling Method Makes Aseptic Flour

➤ FROM an inventor in France, in pre-liberation days, came the application that eventuated in patent 2,379,677, on a milling method which the inventor, Voldemar Borsakovsky, claims will produce a flour so nearly free of bacterial life that its keeping qualities are better.

The wheat is first moistened, then tumbled in a rotor having abrasive inner walls, to "peel" off its indigestible cellulose outer coat. After the loosened bran and abrasive particles have been separated out, the grain is sterilized with a germ-killing gas, and finally milled in an atmosphere of a non-toxic gas.

Because rights in patents issued to citizens of formerly enemy-occupied countries have not yet been unscrambled, this patent is vested in the Alien Property Custodian.

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IN SCIEN

ELECTRONICS

Lighthouse Tube Used To Make Radar Effective

See Front Cover

➤ THE FAMOUS lighthouse tube, known to engineers as a megatron tube, in which the grid, anode and cathode are of unconventional design (*See SNL, August 19, 1944*), was developed for use in radar, it is now revealed.

As frequencies in use became higher and wavelengths shorter, electronic tubes to produce the radio signals had to be smaller and the ability of the conventional type of tube to produce the necessary radio power became less. The new lighthouse tubes shown on the front cover of this SCIENCE NEWS LETTER are extremely compact and yet they have a high power output. The larger tube on the left is a transmitting tube; the others are receiving tubes.

Now that the war is over, it is anticipated that these tubes will be useful in television and FM systems as well as navigation aids.

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INVENTION

Separate Sterilizing For Cans and Contents

➤ SOMETHING new in canning methods for fruit and vegetable juices and other liquids is offered in patent 2,380,964, obtained by R. H. C. Mueller of Oak Park, Ill. In conventional canning practice, the cans are first filled and sealed, then placed in steam sterilizers for processing. This offers some disadvantages, especially when the juices are liable to injury by the prolonged high temperature necessary.

In Mr. Mueller's process, the cans are sealed empty, then cooled by passing quickly through a chilling bath, then conveyed to the filling machine. In the meantime, the juice or other liquid has been sterilized in bulk and is awaiting the cans in a reservoir, under a sterile atmosphere.

A hole is punched in the end of each can, the sterile liquid is forced in under pressure and the opening is quickly sealed while the can is still in the sterile atmosphere.

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E FIELDS

CHEMISTRY

Permanents Achieved By Splitting Molecules

➤ THE TRANSFORMATION of straight, lank hair on a woman's head into soft curls and ringlets by the cold wave method of permanent waving turns out to be another triumph of modern chemistry.

Even the cracking of petroleum for the production of ethylene gas is involved, since substances synthesized from this may be used in the process. Details of the chemistry of cold waving are reported in *The Technology Review* (June), edited at the Massachusetts Institute of Technology.

Briefly, the cold wave method consists in applying chemicals which split certain protein molecules in hair. Among the chemicals that may be used at this stage are sodium sulfide, ammonium thioglycollate, and beta-hydroxyethylmercaptane, synthetic from ethylene gas. The unpleasant odors from these are camouflaged by perfumes.

The atoms of the split molecules are pulled into another pattern by the winding process familiar to those who give and get permanents. Then other chemicals are applied to recombine the atoms. Your hairdresser may refer to this last step as the "neutralizing" process. Chemically, it is an oxidizing process.

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PHYSICS

Defense Planned Against Radioactive Poison Gas

➤ DISCLOSURE of a hair-raising war danger now happily passed but which must have given a handful of scientists and top government officials many sleepless nights appears in technical information about the atomic bomb released by the War Department.

The possibility that the Nazis might make a surprise use of radioactive poisons in a "particularly vicious form of poison gas" was considered early in the American scientists' atom splitting experiments. Defensive measures were planned.

Radioactive poisons resulting from atom splitting were first mentioned in May, 1940, in a report of a National Academy of Sciences committee. They develop as the chain reaction of uranium splitting proceeds and have, in practice, turned out to be "the most troublesome feature of a reacting pile." They differ chemically from uranium, so it was believed it might be possible to extract them and use them "like a particularly vicious form of poison gas."

This idea was developed in a report written by Dr. E. Wigner and Dr. H. D. Smyth of Princeton University on Dec. 10, 1941, the day before we declared war on Germany. These scientists concluded that the fission, or atom-split, products "produced in one day's run of a 100,000 kilowatt chain-reacting pile might be sufficient to make a large area uninhabitable."

The use of these poisons was not recommended by the scientists, nor has it been seriously proposed since by the responsible authorities. The scientists and authorities, however, knew that the Germans were also racing to produce atomic power for military use.

"Serious consideration was given," the report states, "to the possibility that the Germans might make surprise use of radioactive poisons and defensive measures were planned."

Radioactive xenon, radioactive iodine and some 28 other chemical elements, all highly radioactive, are produced when uranium is split by fission. The safe disposal of these poisonous gases, so as to avoid endangering the territory surrounding the uranium-splitting plants, was a troublesome problem. The scientists were able to solve this as well as to plan for defense against possible use by the enemy of radioactive poisons produced by uranium fission.

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ENGINEERING

Glass-to-Steel Fusing Makes Airtight Seals

➤ GLASS-TO-STEEL fusing, to make a permanent airtight seal for metal electron tubes, is now possible through a method developed by engineers of the tube division of the Radio Corporation of America. It permits the use of a staple metal for the glass-to-metal seal in place of special alloys.

The new method depends upon the control of processing so as to secure good "wetting" of the steel by the glass. Also it incorporates a mechanical design which provides compression strains at the glass-metal boundary, thus compensating for the difference in expansion of the metals.

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RADIO

Television Broadcasting From the Sky to Be Tested

➤ TELEVISION broadcasting from stations in the sky six miles above the earth, in airplanes slowly cruising in circles, will be tested as soon as permits and equipment can be obtained, it is just announced by the Westinghouse Electric Corporation. Initial flight tests of the system, known as Westinghouse Stratovision, are expected to be made this fall.

The system would employ a low-powered ground transmitter to send television, and frequency modulation broadcast waves, to a specially designed high-altitude plane circling overhead. The plane would be equipped with receivers and transmitters for re-broadcasting the programs back to the earth.

The advantages to be gained by this television broadcasting from the stratosphere are wide coverage and relatively low cost over other systems proposed. Television and FM waves travel in a straight line and for all practical purposes, according to Walter Evans of Westinghouse, stop at the horizon. This means, he says, that television broadcasts from the highest practical tower erected on the ground cannot be received much more than 50 miles away.

"The Stratovision system," he explains, "simply puts the antenna and transmitter in an airplane flying in lazy circles 30,000 feet above the earth, out of sight of human eyes. The shortwaves sent out from this airborne antenna would blanket the earth's surface like a great inverted ice cream cone, covering an area 422 miles across or equal to the combined area of New York, Pennsylvania and New Jersey."

Eight such Stratovision planes properly positioned would give television and FM coverage from coast to coast.

"To provide comparable service by ground installations," Mr. Evans declares, "would require approximately 100 costly relay towers and hundreds of transmitters; or a coast-to-coast coaxial cable network which is estimated to cost at least $100,000,000."

The addition of six more planes in the right places would provide Stratovision coverage for 51% of the nation's area and 78% of its population.

A special slow-speed plane, almost as large as the B-29, has been designed for the stratovision system by the Glenn L. Martin Company of Baltimore.

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GENERAL SCIENCE

Critical Shortage

Wastage of scientific talent in making war has led to deficit of over 150,000 in training in science. National science scholarships urged to meet need.

By WATSON DAVIS

➤ THE greatest and most critical shortage in America, when viewed from a few years in the future, is the lack and wastage of scientific talent.

Science and technology in making war have been given the highest priority. Industry and government are making large and promising plans for the expansion of scientific research now that the war is over. Nevertheless, the young men who should be the scientists of the future have been inducted into the armed forces without any opportunity to contribute to the nation and the world their unusual and relatively rare abilities. By the thousands they are still in the armed forces doing non-scientific tasks.

Almost alone among the nations of the world, the United States has, through a series of expediencies and unhappy decisions in high places, left the scientific research abilities of the nation relatively unprotected from the ravages of war.

In England and in Russia, and even in Germany, young scientists were not allowed to join the fighting forces even if they wished to do so. They were set at tasks for which their abilities and training fitted them so that they could be best used in the war effort.

The recent report by Dr. Vannevar Bush, director of the Office of Scientific Research and Development, to the President stated:

Few Over 18

"Among the young men and women qualified to take up scientific work, since 1940 there have been few students over 18, except some in medicine and engineering in Army and Navy programs and a few 4-F's, who have followed an integrated scientific course of studies. Neither our allies nor, so far as we know, our enemies have done anything so radical as thus to suspend almost completely their educational activities in scientific pursuits during the war period."

In the United States the question of whether a young scientist in college, or working in a research laboratory, would be inducted into the armed service was left largely to the discretion of the local draft board. Draft boards, of course, have only limited information as to the needs, methods and urgencies of research. They are under the democratic pressure "that your boy is no better than my boy."

As a consequence, it is estimated by a careful inquiry of experts that the deficit of science and technology students who but for the war would have received bachelor's degrees, is about 150,000. And the deficit of those obtaining Ph.D. degrees in these fields will amount in 1955 to about 17,000. It takes at least six years from college entry to achieve a doctor's degree or its equivalent in science and engineering. This advanced training is quite necessary these days for those who are to explore the unknown and make the necessary developments out of which will come new cures for disease, new industries and better living conditions.

Only Part of the Story

These figures from the Bush report on our great endless frontier, which is science, tell only part of the story. These figures show only the great lack of scientific research personnel in order to keep our nation's scientific and technological resources at the level that they were before the war.

Now that the war is ended, truly tremendous research programs are being announced and discussed. One industrial operation alone is to spend $20,000,000 on a new research laboratory and expand manyfold its already extensive investigational facilities. The Bush report recommends federal research expenditures of $33,000,000 for the first year, rising to $122,500,000 at the end of five years, this expenditure to be in addition to the regular federal expenditures for research at a peacetime level.

Real need of scientists of the future is for this reason much greater than the estimates of deficits would indicate. For every scientist that worked before or during the war, two or three will be needed after the war. At least a quarter of a million young men and women should get back to college as fast as possible and begin studying these science and technical courses which they have been unable to pursue due to the interruption of the war.

This figure does not include the need for medical students to augment and maintain our supply of doctors in this country, nor does it include the related specialties of dentistry, pharmacy, veterinary medicine, etc.

Neither does it include the need of technically trained workers for control and development in industrial plants that make chemicals, metals, machinery and the other thousand and one things that are needed in the peacetime world.

One of the greatest blows to the continuance of scientific training by young men in the armed services was the placing in the infantry of approximately 100,000 Army specialized training corps men, about the middle of 1943. Up to that time the Army, as well as the Navy, had a college training program in many institutions throughout the country in order to provide the armed services with the technical and scientific personnel that was needed. This program was for all practical purposes wiped out in 1943 by the decision that placed all of these young men in the infantry, preparatory to the European invasion. Whether this sacrifice was needed to provide additional strength to the infantry will be a judgment of history. It is indisputable, however, that our scientific forces would, in all probability, be in much better condition now if this well-thought-out program had not been abandoned at that time.

There would have been some loss in scientific training even if the Army specialized training program had continued because the subjects taken in these college courses as arranged by the Army were oriented toward military service rather than toward basic scientific technological service. The Navy's various V-programs for officer training in colleges were not interrupted in this manner, and it is to be expected that a larger percentage of the young men in the Navy with potential scientific research abilities will eventually have a larger and earlier opportunity to enter into scientific research and development work.

To rescue the generation of young potential scientists now in uniform, the Army and the Navy are being urged by Dr. Bush and his committee to search out, discover and send back to college immediately those men who prior to or during the war have given evidence of talent for science.

These scientifically talented young men, under this plan, would be ordered, by name, to duty in the United States as students for training in science and engineering of a grade and quality available to civilians in normal times.

The total number that would be selected on merit alone would probably be no more than a 100,000 which, under present conditions, would hardly have military significance.

But for building up the nation's scientific strength, that number would be very significant. These men would constitute the premium crop of future scientists.

Although these careful recommendations have been on the President's desk for several months and the Bush report itself has been public property for several weeks, so far as is known no steps are being taken to put into effect the suggested program or any modification of it.

Officials Insistent

High military officials are insistent that there be continued scientific research along military lines in order that our fighting forces in time of peace may maintain a supremacy which will either prevent war or give us the necessary fighting power in case we are again attacked. Scientific research is considered of major importance in Army and Navy plans for the future. By inaugurating this salvage of scientific talent within the ranks of the Army and Navy, those in command now can provide for future emergencies a national resource which cannot be purchased with dollars or any amount of sacrifice when the emergency arises.

Believing that soldiers in the service being discharged from the Army will need more college training than they will be able to get under the GI Bill of Rights, the report urges that in the case of those who are found to have marked scientific talent, the amount of education given under the GI Bill of Rights, should be dependent upon the ability to profit from the education rather than just length of service.

The 18-year-old boys who are being inducted into the armed services month by month still include those of great scientific promise who in England and Russia under the most severe conditions of the war would not have been allowed to enter the armed services. Instead, they would have been ordered to go into preparation for scientific research careers.

In the interest of our future military defense as well as our peacetime progress, the Army and the Navy might well take the initiative in keeping these few boys at their scientific studies rather than allow them to join the fighting forces.

How to provide for the constant renewal of our scientific talent is another major problem and a national program to that end has been suggested.

To insure through the long future an adequate supply of scientists and engineers for America, the recommended national science talent program would discover, train and maintain as a National Science Reserve some 6,000 potential scientists each year.

This "army" of young scientists would, after their training in various colleges on national scholarships, go into universities, laboratories, or industrial or governmental research organizations as they wish. But, in a national emergency they would be liable for call into federal service for scientific or technical work.

Under the plan suggested by the science talent committee headed by Dr. Henry Allen Moe and included in the Bush report on postwar scientific research, a total of 24,000 national science scholarships would be in college at any one time. There would be 900 fellows doing advanced work for the Ph.D. degree at any one time.

Selected from all parts of the country solely on the basis of merit, without regard to sex, color, race, creed or need, these potential scientists would receive scholarships patterned after the educational provision of the GI Bill of Rights. Tuition in any approved college would be paid up to $500 a year, and personal support of $50 a month if single and $75 a month if married would be provided.

When fully in operation the plan would cost $29,000,000 a year, a sort of insurance premium for the nation against stagnation in invention, scientific discovery, and industry, and an investment in national defense. One thing industrialists are sure of is that new products and methods must come from research if business is to be good. Military men are convinced that the weapons of any next war will not be those of this war, but will come out of research laboratories of the future, manned by the young scientists to be discovered and nurtured under this science talent plan.

This plan for a federally supported science talent search is no untried innovation in educational and scientific method. For the past four years, the Science Talent Search for the Westinghouse Science Scholarships has been conducted by Science Clubs of America as a Science Service activity. While the numbers and

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Do You Know?

Some *bacteria* emit enough light to photograph objects.

Turkeys would be nearly extinct if they had not been domesticated.

The best pasture for *hogs* is alfalfa, experts claim.

North American Indians had no *beasts of burden* prior to the coming of white men.

Licorice has its characteristic taste due to the glucoside, glycyrrhizin, which is sweet in alkaline, but not in acid liquids.

Devil's shoestring, a wild American plant of the legume family, may be a source of rotenone for insecticides, according to studies in progress in Texas.

War-developed *walkie-talkies* are promised for reliable two-way communication between farms and town.

Butterflies that give off repulsive odors do so as a protection from birds and other enemies, and are found in both sexes; attractive scents are confined to the males.

Old rooster meat is tender and juicy if, six weeks before killing, a tiny pellet of synthetic chemical diethylstilbestrol was inserted under the skin through a small cut; it causes fat to form in the muscles.

A *cereal beverage,* recently patented as a coffee-substitute, is made from bran, poplar bark, molasses and vinegar; it has a coffee-like flavor, it is claimed, and acts upon the membranes of the throat in the manner of coffee.

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amounts of scholarships granted under this program are much smaller each year, 300 of the most scientifically talented boys and girls in the nation have been located and, with the exception of the boys who were inducted in the armed services, most of them have been given opportunities for intensive scientific or technical study.

The Science Talent Search utilizes the newest psychological selection techniques, and combines a science aptitude test rating with searching evaluation of personal qualities and scholastic record. These methods of selections are proposed for use in the larger federal plan, which would use national examinations leading to selection by boards of judges in each of the states.

Although the first Science Talent Search was held at the beginning of America's entry into the war, some of the winners have already graduated from college and are doing research for advanced degrees, in some cases on military problems.

These Science Talent Searches for the past four years (the fifth one is being conducted this fall and every high school senior is eligible to compete) have shown that science talent may be found in the big cities, the small towns and the farms, in those whose parents are poor and in those with millionaire fathers or mothers, in those born here and those who came to our land as refugees.

Good science teaching in school from the first grade through the high school is needed to be sure that the scientifically talented do not go through the educational mill without their interest in science being awakened.

The intelligent reporting by American newspapers of scientific news is of major value in bringing the importance, method and possibilities of science to the attention of young people who possess scientific talent but who, except for the press, might never know of the opportunities and needs in this important field.

There exists in America the largest science organization in the world, the more than 150,000 members of Science Clubs of America, organized in some 7,500 clubs in the nation's high schools. From among these boys and girls who make science their serious hobby, many of America's scientists of the future will come.

How good a job they will be able to do in building us all a better future will depend in large measure on how thoroughly America searches for latent science talent and whether this search is supported with the necessary dollars and intelligent planning.

Science News Letter, August 25, 1945

CHEMISTRY

Transmutation Preferred

➤ TRANSMUTATION, for centuries the alchemists' goal, has suddenly become the laboratory method of choice of the group of scientists who worked out the chemistry of the atomic bomb. The account appears in the report, released by the War Department, written by Dr. H. D. Smyth, of Princeton University.

The problem was to separate two or more kinds of the rare metal uranium, which differ from each other in no discoverable way except that one is slightly heavier than the other. To separate them by this difference would have been a slow, tedious and unsatisfactory task, especially since the part that would be valuable for the project makes up less than one part in a hundred in any quantity of the ore.

Here the knowledge and skill of chemists who have studied the behavior of radium and other radioactive elements was put to good advantage. It has been found in work with such elements that their weight and their chemical nature depend on two kinds of minute particles which make up the hearts of their atoms.

The number of one kind of particle, the proton, in the atom heart is responsible for the nature of the element. One proton makes hydrogen, 26 protons make iron, 92 protons make uranium. The other kind of particle in the atom heart is the neutron. Uranium 235 has a net result of 92 protons and 143 neutrons, adding up to 235, according to the chemists' calculations, while uranium 238 has three more neutrons than its lighter isotope.

These two uraniums had to be separated, because only U235 would split up the way the scientists wanted it to for use in the atomic bomb. U238 would not. By lucky chance, the very property of U238 which made it useless for the purposes of the bomb provided the clue which solved the separation problem.

The more plentiful form of uranium, U238, could be made to undergo transformation into another kind of element by first adding to the nucleus of its atom a neutron, to make it so heavy that it would become unstable, then by allowing this heaviest uranium atom to shoot an electron out of its structure. This loss of electrons from the total quantity of uranium showed itself as a phenomenon familiar to scientists as the beta ray. It is the peculiar nature of radioactive elements to change into something else when they emit beta rays, and that something else is, oddly enough, not a lighter but a heavier element.

Accordingly, when uranium 239, formerly the heaviest known element, emitted its beta ray it changed into a still heavier element, which the scientists working with the material named neptunium. Neptunium proved to be a rather unstable element, and emitted a beta ray in its turn. This change in the atom turned neptunium into another new element, which was named plutonium. The names of these three elements are taken from the three farthest planets of our solar systm.

Plutonium turned out to be a fairly stable element, about whose chemical properties enough was soon learned to prove that chemical separations of this new material from its parent uranium would be a relatively easy task. Plutonium does not readily follow the pattern by which it was formed, but makes the opposite transformation by which it gives off an alpha ray and turns back into uranium 235. This, however, happens so slowly that there is plenty of time for the atom-splitting reaction of plutonium to do its work.

Science News Letter, August 25, 1945

CHEMISTRY

Rubber Goods Produced In Tremendous Quantities

➤ SOME idea of the tremendous wartime production of rubber goods for the armed services may be gleaned from a report by the Rubber Manufacturers Association. Tires are but a single item. Equally essential, perhaps, are rubber boots for troops, battery cases, rubberized textiles, heels and soles for shoes, and rubber pads for tanks, aircraft and battleships.

More than 30,000 different rubber products were manufactured for war uses. Some were made from the limited supply of natural rubber, some entirely of synthetic rubber, and others of a combination of the two. The production program was hampered to some extent by the necessity of manufacturers and workmen learning how to use the new synthetic raw material.

Tens of millions of tires for land, air and amphibious vehicles have been produced since the beginning of the war, the report states. Over 45,000,000 pairs of rubber boots and shoes have been made, and some 10,000,000 hard rubber battery cases. More than 150,000 pounds of rubber compound is used in each new battleship. Over 360,000,000 yards of rubber-coated fabrics have been produced. Thousands of other rubber needs have been met.

Rubber industries had considerable natural rubber to use the first two years after Pearl Harbor, with some 600,000 tons of it on hand in December, 1941, and additional on boats on the sea. In three months the Japs controlled 90% of the world's sources of natural rubber. The first pound of synthetic rubber from the first plant in the joint government-industry program was produced on May 18, 1942. New synthetic rubber is being produced at a rate of over 700,000 tons a year. War needs have been met, and some rubber is available for the more essential civilian needs.

Science News Letter, August 25, 1945

In the Maintenance of Water-Balance

The dynamic equilibrium between intravascular and tissue fluids derives its stability and its adaptability to the body's flexible demands from the plasma protein of the circulating blood. Unless this regulating influence of the plasma protein is maintained, the normal interchange of fluids between blood and tissue becomes disturbed, and edema ensues.

Control of the vital water exchange depends upon both proper constitution and quantitative adequacy of the plasma protein. For its maintenance and regeneration plasma protein depends on the amino acids derived from the proteins of the foods eaten.

Among the protein foods of man meat ranks high—not only because of the percentage of protein contained, but principally because the protein of meat is of high biologic quality—able to satisfy every protein need.

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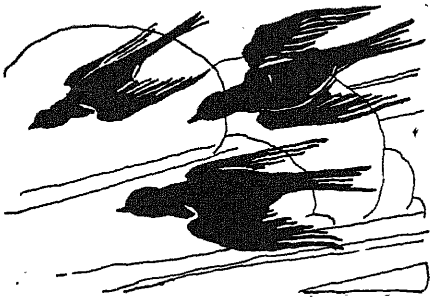
ORNITHOLOGY

NATURE RAMBLINGS

by Frank Thone



Ready to Fly

➤ MOURNFULLY melodious, the old song tells us:

> "The swallows are making them ready
>   to fly,
> Wheeling out on a wintry sky."

Actually, swallows and a great many other birds "make them ready to fly" long before the sky becomes at all wintry. Those huge, twittering, circling flights of swifts and swallows at sunset on late summer days; the great, noisily talkative parliaments of blackbirds; the smaller, clubbier assemblies of many other bird species, are all parts of their pre-migration behavior patterns. They aren't starting south just yet, but they're "thinking about it." Some morning they'll be gone, though most of us are so little observant that we do not miss them until practically the whole summer bird population has slipped away.

So quiet is the migration of most smaller birds that it long remained one of the most mysterious phenomena of natural history. The ancient Greeks are said to have believed that swallows did not fly away at all, but buried themselves in the mud at the bottom of ponds, hibernating there with the frogs and turtles. Even in modern times, a great deal remains to be learned about these long seasonal flights.

One very curious effect on the winter bird populations of North America is produced by the triangular shape of the continent. Eastern and western species belonging to the same large groups but zoologically quite distinct are often funneled into the same close quarters in Central America and southern Mexico. Ornithologists making winter field trips to those regions often find birds in the same tree that in summer would not be closer together than Michigan and Oregon.

The question might arise, why do not these related species become hybridized? The answer, of course, is that in winter they are concerned only with feeding and keeping away from the cold, not with nesting and rearing young. In spring, they fly their several ways back to their widely separated breeding grounds. So the species remain distinct.

One of the outstanding riddles that still haunts ornithologists is how the birds learn their way south. Older birds, that have made the journey before, might be credited with remembering the route. But in most species, the young of the year start first, and they find their way to the winter feeding areas just as accurately as if they had experienced guides. That's something for students of bird behavior to work at for a while.

Science News Letter, August 25, 1945

CHEMISTRY

Processed Cream Kept Fresh, Tasty, for Year

➤ PROCESSED cream will be fresh and tasty after being kept at room temperature for a year or longer, thanks to a new method which sterilizes the cream. So far used exclusively in the production of processed table cream and whipping cream for the armed forces overseas, the new method recently announced results from six years of research by the California Milk Products Company, Gustine, Calif.

Only four minutes is needed to process the product, known as "Avoset." Instead of being pasteurized (unsuitable for such a process because it does not kill all bacteria) which requires that the cream be heated at 145 degrees Fahrenheit for 30 minutes, the mixture is preheated and sterilized at temperatures varying between 260 and 280 degrees Fahrenheit for about four minutes.

Prior to processing, a small amount of vegetable "stabilizer" is added to the sweet, fresh cream, to keep the milk solids in the finished product from separating out on long storage. After sterilization, the mixture is rapidly cooled and passed into a sterile holding tank, ready for bottling.

Air in the bottling and capping room is kept virtually free of dirt and bacteria by the Precipitron, an electrical air cleaner, developed by the Westinghouse Electric Corporation.

Science News Letter, August 25, 1945

Cacti found outside the Americas, Ceylon, Madagascar, and the Congo, have been taken there by man.

Because of its great weight confined in a small space, *lead* is used in factory lift trucks as a counterbalance to the load which is usually picked up and carried on racks or a platform in front of the truck.

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• Books of the Week •

APPLIED MATHEMATICS FOR RADIO AND COMMUNICATION ENGINEERS—Carl E. Smith—*McGraw,* 336 p., illus., $3.50.

BONE-GRAFTING IN THE TREATMENT OF FRACTURES—J. R. Armstrong—*Williams & Wilkins,* 175 p., illus., $7. Foreword by R. Watson-Jones. A William Wood book.

THE ELECTROLYTIC CAPACITOR—Alexander M. Georgiev—*Murray Hill Books,* 191 p., illus., $3.

ELECTRONICS LABORATORY MANUAL—Ralph R. Wright—*McGraw,* 77 p., illus., $1. Laboratory textbook for students taking their first course in electronics.

LATIN AMERICA IN MAPS: Historic, Geographic and Economic—A. Curtis Wilgus—*Barnes & Noble,* 330 p., paper, illus., $1.25. College Outline Series.

METEOROLOGY FOR PILOTS—Robert W. Mudge—*McGraw,* 259 p., illus., $3.

THE NEW APPLIED MATHEMATICS—Sidney J. Lasley and Myrtle F. Mudd—*Prentice-Hall,* 428 p., illus., $2.20. 3rd. ed., revised and enlarged.

PROBLEMS IN ENGINEERING DRAWING—A. S. Levens and A. E. Edstrom—*McGraw,* 52 p., illus., $2.50. Series 1.

REPTILES OF THE PACIFIC WORLD—Arthur Loveridge—*Infantry Journal,* 236 p., illus., paper, 25 cents. Fighting Forces ed., available to members of the Armed Services only.

SOLUTION IN ASIA—Owen Lattimore—*Infantry Journal,* 138 p., paper, 25 cents. Fighting Forces ed., available to members of the Armed Services only.

Science News Letter, August 25, 1945

ELECTRONICS

Safe Landings

Ground-control approach radar equipment will assist pilots through heavy overcast or in poor visibility. Can "talk-down" a blindfolded pilot.

By A. C. MONAHAN

➤ OF SPECIAL value for postwar commercial flying, to assist safe landings through heavy overcast or in poor visibility, is a ground-control approach radar equipment demonstrated before a group of science writers by technical men of the Army Air Forces. A blindfolded pilot, flying a gigantic plane, was "talked down" to the runway by a control operator while he was still several miles from the field and a thousand feet in the air. It was the most spectacular demonstration given to the group who had been assembled to learn about former radar secrets and Army specialized radar equipment.

All instructions to the pilot from the control were audible to the group by a special loudspeaker attached for the purpose. We watched the pilot turn to the right or to the left, or downward, immediately upon receiving instructions. He approached the landing strip at the proper end exactly at dead-center. When about ten feet from the surface, and ordered by the operator to take over, he removed the blindfold and made a perfect landing. The feat was a simulation of conditions encountered in landing through a heavy fog with a zero ceiling when the pilot cannot see the runway until the last moment.

The equipment is on the ground only. It links up with the radio-telephone equipment with which all military and most commercial aircraft are equipped. The operating crew of the control equipment "sees" by radar apparatus the plane in the air and the landing strip. The apparatus is as complex as any radar set in existence. The complete unit occupies two large trucks, one of which contains the air-conditioned operating unit and the other a power unit.

Tail Warning Set

A tail warning radar set, used most commonly in night fighters, lets a pilot, approaching a target or returning to his home station, know if he is being followed by another plane. It does not tell him if the trailing plane is friend or foe, but it does put him on his guard.

This tail warning device may serve a valuable purpose in civilian aviation in the coming days when commercial night-flying aircraft congest the airlanes.

Radar Altimeters

Low-range altimeters, for use within 400 feet of the earth, and high-range altimeters for altitudes between 400 and 4,000 feet, that measure the distance quite accurately between the plane and the surface under it, have also a distinct value in civilian flying. They are radar devices, depending in action on the time required for the high frequency wave to reach the earth and return to the instrument. They do not, like the barometer, indicate merely height above sea level.

Many of the military applications of radar which the Army Air Forces pioneered in combat were demonstrated or explained to the visiting group.

An unusually interesting piece of equipment, known as IFF, is originally of British design but is American made. IFF stands for "identification, friend or foe." Special equipment in a plane responds only when actuated by an interrogating set on the ground or in another plane. It responds automatically in the particular code set for the day. The pilot is unconscious of the waves from the interrogating set and also of the response sent out by the equipment on his plane. If an approaching plane fails to give an answer, and the right answer, it is regarded as a foe and immediately subjected to gunfire.

Science News Letter, August 25, 1945

ADD A POTENTIOMETER TO YOUR LAB'S TEMPERATURE-MEASURING INSTRUMENTS

A lab equipped to measure temperatures with a potentiometer has certain advantages:

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INFANT CARRIER is a canvas form, in which the baby is placed, suspended by a broad strap over the mother's shoulder. The baby sits upright, facing the mother, with his legs projecting through holes in the bottom of the canvas, and his head against her shoulder in the usual carrying position.

Science News Letter, August 25, 1945

MACHINE running-time is recorded automatically by a new instrument for checking machine operation. It records on a chart both the "on" time and "off" time of production machinery and other similar equipment and also the time of day when these periods occur.

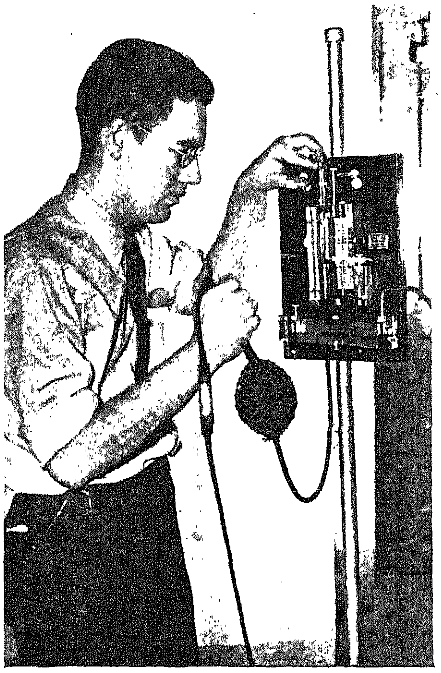
Science News Letter, August 25, 1945

SYNTHETIC rubber pad, 116 inches long, 50 inches wide, and eight inches thick, is used in hydraulic presses to form heated magnesium sheets for airplane parts. When compressed, the pad transmits the full 5,000-ton pressure of the ram to the sheet, forcing the metal into the desired shape.

Science News Letter, August 25, 1945

SPECIAL GAUGE, to measure the stack gases given off by new oil burners, give direct readings indicating the hazard involved. Transparent plastic cases over the vertical and horizontal scales, shown in the picture, help preserve them under corrosive conditions.

Science News Letter, August 25, 1945



FLAME DETECTORS, placed at danger points inside the engine compartment in buses, flash red lights in front of the driver instantly on the outbreak of a fire. The driver then operates a fire handle near his seat and releases a flood of compressed carbon dioxide gas into the compartment, thus choking the fire.

Science News Letter, August 25, 1945

PORTABLE electric heater has two sheet metal cylindrical upright housings, one centered within the other with air space between them, a gas-filled tungsten-filament radiant heat lamp, and a small electric fan to force air movement. The fan is at the bottom; the lamp is in the inner housing.

Science News Letter, August 25, 1945

If you want more information on the new things described here, send a three-cent stamp to Science News Letter, *1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 273.*

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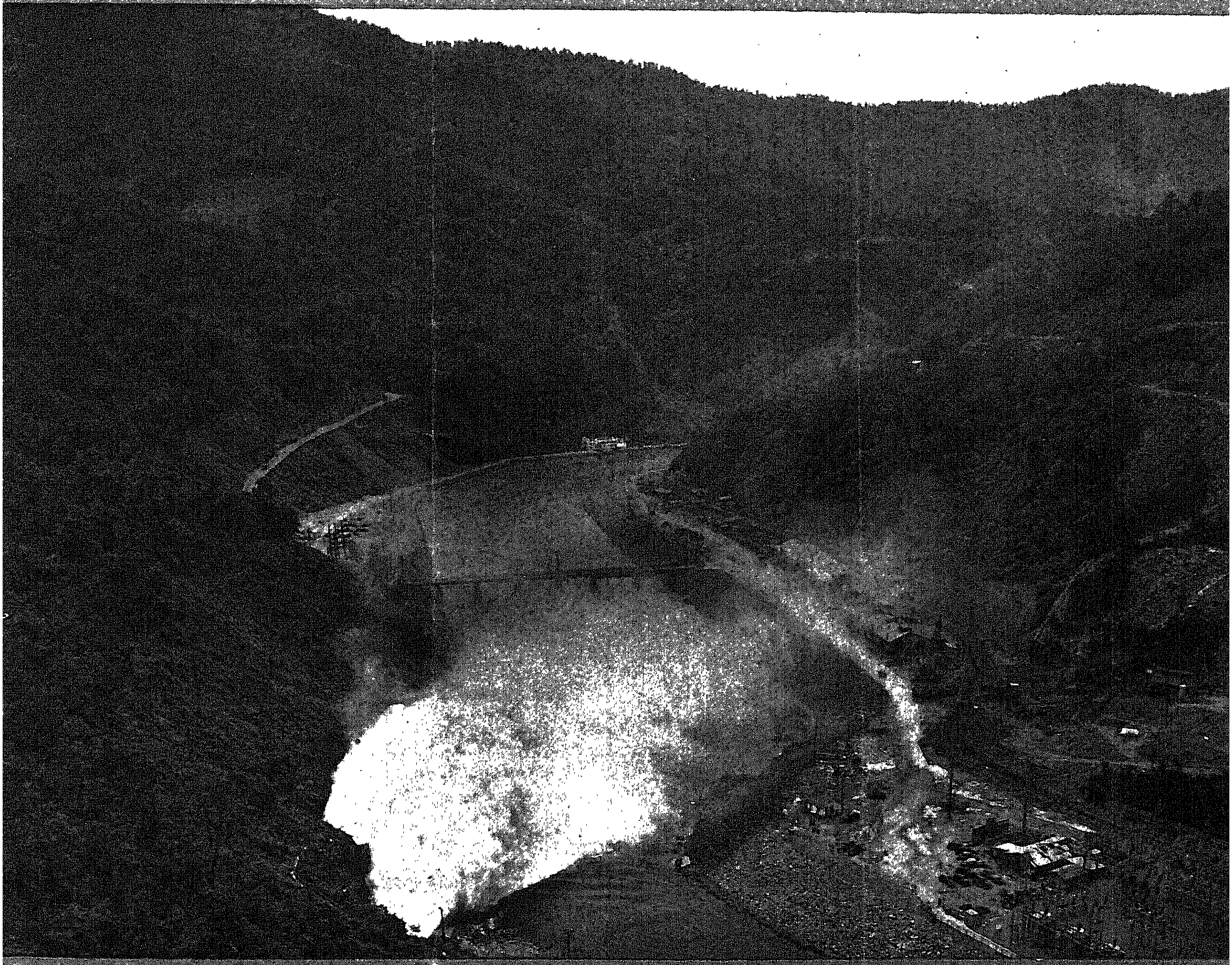
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • SEPTEMBER 1, 1945



Artificial Shower

See Page 133

A SCIENCE SERVICE PUBLICATION

ELECTRONICS

Deadly Bombers

Radio-radar robot planes, with world-spanning flight ranges will send humanity back to cave-dwelling, unless we learn how to keep the peace.

➤ THE radio-radar robot bombers described by Gen. H. H. Arnold will turn men into moles if we insist on settling international arguments by war. No city or fortress or factory on land, no convoy or even single ships at sea, can count on safety if unmanned planes or rockets can now or in the near future be guided by radio to the vicinity of the target, and then finish in Kamikaze dives, pinpointed into their targets by "heat, light and metal reactions."

Camouflage will do no good, for radar ignores such flimsy concealments as nets and painted rags as completely as it does smoke screens or natural fog. It "sees" the hard surfaces beneath the concealment and reports their whereabouts with the ruthless accuracy of the machine that it is.

If vital military installations are to be concealed from the radar's pitiless eye they must be given a "soft" covering, deep enough to give the same effect as natural soil and the vegetation growing on it. And the most practicable way to do this is to use soil and vegetation *themselves rather than strain after facsimile effects.*

This would mean putting underground industrial plants and warehouses, hangars and railway stations, barracks and hospitals, in brief the whole enormous complex of a civilization's material basis. Some advantage might be taken of natural caves and abandoned mines, as the Germans are reported to have done to some extent in the war that ended last spring. But most of the caves would have to be dug by the men who would later take up their troglodyte existence in them.

Deep burial would probably be the safest in the end, no matter how much more it might cost. For plenty of earth overhead would be the only chance of safety against the atomic explosives which the future far-ranging robot bombers would doubtless carry. In the end, even hundreds of feet of self-burial might not suffice for protection against a foe really determined to dig out and destroy the new race of human moles.

Even vainer than seeking safety from the terrors of the newer warfare by digging in the bowels of the earth are the proposals to "forbid" the use of such weapons in war. Historical records abound in such efforts—all ending in failure. One needs only recall the well-intentioned proposals put forward at earlier peace conferences at the Hague, to ban the use of poison gas and of aircraft in war—to neither of which the American delegates would agree.

Duelling in civilized communities was stopped not by forbidding the use of pistols in duels but by the pressure of public opinion against the practice itself and by the use of police force against bellicose gentlemen who insisted on waging little private wars. If nations are to be similarly restrained from mutual slaughter, it must be by the larger-scale application of one or both of these principles.

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ZOOLOGY

Worm Is Both Father And Mother to Offspring

➤ WORMS that live in sea-bottom mud have been shown capable of producing offspring sexually yet without the necessity of mating, the same individual being both father and mother. A brief report on this curious phenomenon is given in *Science* (Aug. 17) by Dr. William C. Purdy, retired biologist of the U. S. Public Health Service, now living in Cincinnati.

Many of the lower animals are both male and female, functioning as mothers at one time, as fathers at another; oysters and earthworms are common examples. There are others, also, that can produce offspring through many generations of unmated females; a much-too-common example of this is furnished by the ordinary aphid or plant louse. But a "male-female" animal that is both sexes at once, or in such quick alternation that it can be both father and mother to the same offspring, seems to be something of a rarity.

Dr. Purdy placed solitary individuals of his worms in small glass vials, each with enough mud to give it shelter and a chance to build the hard tubes the worms use for protection. The mud had been carefully searched with a microscope, to make sure it sheltered no other worms and contained no worm eggs. Then each worm was left to its own devices, except for weekly feedings.

Presently young worms began to appear. Six of the one-worm cultures, at the end of about seven months, had produced a total of 208 young. Another, kept for two years, produced 19 young during the first year and 148 during the second.

Dr. Purdy's worms represented two genera, known to zoologists as *Tubifex* and *Limnodrilus.*

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AERONAUTICS

Transport Helicopter Has Two Rotors in Tandem

➤ A PASSENGER or cargo helicopter with two rotors, one mounted at the front and the other at the rear on the body, has passed successful tests in the air. It is claimed to be the first successful design using two rotors in tandem, and the first helicopter for air transport operations. Its capacity is 10 passengers. It was built for the U. S. Navy, and additional craft of the same type are under construction.

This largest of helicopters so far constructed was designed and constructed by P-V Engineering Forum, Inc., and was given its first test in the air during March this year. In the air, it resembles somewhat a gigantic center-sagging flat-bottomed row-boat, suspended from two knobs, one at each end. In reality these knobs house the rotor mechanisms, and turn the rotors which are above them.

The streamlined fuselage of the craft is 48 feet long and 13 feet high. Its Continental-Wright R-975 engine is completely enclosed aft of the cabin. Flight tests prove that the craft has unusual stability and control characteristics, and is one of the fastest helicopters flying. Its high efficiency represents, it is claimed, the biggest step forward in helicopter design since the original Sikorsky.

This new helicopter, designated the PV-3, can land in a 100-foot-diameter clearing on land or water. Because of this, it is pronounced ideal for picking up wounded men from inaccessible areas. Equipped with either an external or internal hoist, it can perform rescues while hovering in the air close to ground or water surfaces.

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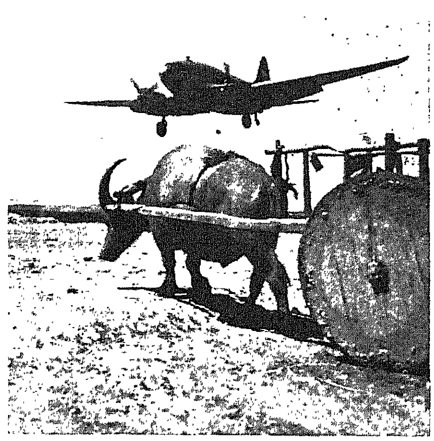
Spain's principal agricultural crop is *grapes,* with olives second.

AERONAUTICS

VHF for Safe Landings

Instruments make it possible for planes to land through overcast skies at three-minute intervals. Use very high frequency radio.



OLD AND NEW—The water buffalo assigned to the task of building a runway in China is unperturbed as one of our Fourteenth Air Force planes roars above him. The water buffalo is the principal beast of burden in most of China. Army Signal Corps photograph.

➤ SAFE AIRCRAFT instrument landings at overcast airports at three-minute intervals are now possible by a new technique and very high frequency radio apparatus developed by the U. S. Civil Aeronautics Administration at its experimental station in Indianapolis at the municipal airport. By this method approximately 20 planes can be brought safely in on a single runway in an hour, while under the usual method the number is only four or five. It doubles the number of instrument landings an hour over that obtained in a method demonstrated only two months ago at the Washington, D. C., airport by the same organization.

The new method assists greatly in solving one of the most serious problems facing commercial and private flying with the greatly increased use of airways now expected. With high visibility and good flying and landing conditions, planes can safely land at a rate approximately 60 an hour on a single runway. When visibility is such that landings must be by instrument, approaching planes, under radio orders from the control tower at the port, must be "stacked up," circling at levels 1,000 feet above each other at some distance from the field, waiting often an hour or more before they can be permitted to land.

Very high frequency radio, called VHF for short, is the key to the new technique. Its great advantage is that the VHF channel is basically static-free. With the present lower frequency radio static causes much difficulty, and it is worse in bad weather when clear reception is most needed. Approach guidance is by means of a localizer element, also operated on VHF.

The new technique does not employ radar, but later, when certain developments now under way are more nearly perfected, a combination of the VHF control and radar will probably be used. This will help the tower control man "see" approaching and stacked planes, and, perhaps, result in instrument landings at the rate good weather landings are now made.

The technique of stacking and communication with the stacked planes is important in the new method. Planes are held behind a radio vertical "fan marker" 10 miles from the tower on the approach airlane. With the VHF radio equipment all pilots in the stack can hear the instructions to any individual plane, and therefore be ready for immediate action when their specific instructions come. This is a time-saver. When they hear the lowest plane in the stack ordered in, they know that each of them in turn will be lowered a thousand feet, and the pilot of the new low plane adjusts himself to be at the marker at the exact time designated by the tower man.

In a recent demonstration made for visiting scientists and aviation experts, five CAA planes participated in instrument landings under the new technique. The visitors, by means of loud speakers attached for the occasion, could hear the instructions to the pilots and their acknowledgments. The five planes made landings at intervals varying only a few seconds over or under the three-minute intervals.

When the first plane had covered about half the distance from the 10-mile fan marker to the airstrip it had glided down to perhaps a thousand feet of the earth, and the second plane was in place at the marker at a 2,500-foot level and immediately, when ordered, followed the first one in.

The government aeronautics experiment station in Indianapolis is maintained by the Civil Aeronautics Administration to develop aids to flying. It is not an institution for research and invention. Its job is to bring to practical application inventions originating in the aviation industry or in some other government agency. Much of its work, during the six years it has been in operation, has been in the development of radio aids to flying.

Its work, however, has not been confined to radio alone, but has included many other projects such as flutter recorder, fabric tester, transmissometer, approach lighting, impact-resistant windshield, stall warning device, and others. Among the radio aids developed are the instrument landing equipment and technique, the omni-directional radio range, and the aural-visual radio range.

The transmissometer makes a continuous record of the resistance of the atmosphere to the transmission or penetration of light. In other words, it makes a visibility record. A narrow beam of light, carefully calibrated, is directed at a distant photoelectric cell. The response of the cell varies with the amount of light coming through.

The station is working on an experimental high intensity beacon, consisting of a series of evacuated glass coils, through which a bank of condensers discharges several thousand amperes at about 3,000 volts. The resulting flashes are of about 50,000,000 candlepower, visible to approaching planes in daylight but too bright to be used in darkness.

The station, also, has on the landing field an installation of two-color boundary lights. They show red from the airport side, and green from the outside. It has a glide path indicator that shows a flashing light to an incoming pilot. If he is on the correct gliding path for a landing, the light appears white. If he is above the correct path, the light appears green, and if below the light appears red.

All CAA traffic control towers are already equipped with the VHF system to assist instrument landing. Before the system can be put into full use commercial and other planes will have to be properly equipped. There is a necessary transition period, and during it control towers will necessarily use their older existing equipment as well as the new VHF equipment.

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MEDICINE

Pain of Shingles Relieved

Injections of the local anesthetic, procaine hydrochloride, into appropriate masses of nerve cells gives instant relief from herpes zoster.

➤ THE INTENSE pain of herpes zoster, or shingles as it is popularly known, can be relieved instantaneously and permanently by a nerve block treatment, Dr. Thomas Findley and Dr. Reynold Patzer, of Tulane University School of Medicine, New Orleans, report. (*Journal, American Medical Association,* Aug. 25.)

The treatment, known technically as paravertebral procaine block, consists of injections of the local anesthetic, procaine hydrochloride, into appropriate masses of nerve cells. The method is not new. It was reported by Dr. S. Rosenak, of Budapest, in 1938 and by an American physician, Dr. A. Street, in 1943. Physicians generally, however, are not acquainted with the method, it appears from the report of Drs. Findley and Patzer.

A woman who had had "virtually no rest" for seven days in spite of large amounts of sedative and pain-relieving drugs was completely relieved of the severe pain within 10 minutes after the nerve block was performed. She is among the four patients whose cases are reported by the New Orleans physicians.

A total of 29 cases, including these four, has been reported so far as having had this treatment. In only two was there failure to produce prompt and lasting relief.

Besides the prompt relief from pain, the blisters heal rapidly.

The treatment is not difficult, the physicians report, and "practically without danger if only procaine or allied anesthetic drugs are used and if one is familiar with anatomy."

A virus closely related to that of chicken pox is the cause of shingles, or herpes zoster. The condition is an acute inflammation of certain spinal ganglions, or collections of nerve cells, with various degrees of degeneration in corresponding sensory nerves. The extent of the skin eruption seems to parallel the intensity of the nerve inflammation.

The nerve block treatment relieves the pain, the physicians state, by interrupting a vicious cycle of nerve impulses and abolishing the blood vessel spasm resulting from some of these impulses.

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GEOPHYSICS

Magnetic Survey Shows Probable Petroleum Areas

➤ A MAGNETIC survey, by the U. S. Bureau of Mines, of the Florida peninsula shows areas in the lower part of the state that are favorable for the occurrence of petroleum. This first examination of almost an entire state has proved also the usefulness of this type of geophysical investigation for mineral and petroleum exploration over large areas, according to Dr. R. R. Sayers, Director of the Bureau.

Speed, economy, and the large amount of information obtained about the geology and sub-surface bedrock topography of a region are the outstanding advantages of this survey method, he states. A magnetic survey is the logical start in undertaking geological surveys of large areas, especially in regions devoid of out-crops.

Essentially, a magnetic survey is a method of determining the contours of the underlying granites and other formations—known to the geophysicist as the "crystalline basement." A knowledge of the crystalline basement, particularly in areas covered by marine sediments, he explains, is of fundamental importance to oil exploratory work.

Long ago it was observed, he continues, that magnetic masses within the earth, such as iron deposits, would affect an ordinary compass. These localized magnetic forces now have been harnessed by the precision instruments used in a magnetic survey. Employing a magnetic needle free to swing in a vertical arc, they measure variations, known technically as "anomalies," between local magnetic attractions and the normal magnetic field. With this information it is possible to locate magnetic ore bodies, and many other geological formations.

A technical report of this Florida survey has been prepared by the Bureau of Mines and is available at the Washington office.

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Mosquitoes of the genus *Psorophora* have the habit of laying their eggs in grassy areas that are likely later to be flooded by heavy rains; when the lands are flooded, the larvae hatch out and have water in which to develop.

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ORNITHOLOGY

Migration Is Not Homing

Phenomena often considered similar are in reality direct opposites. Experiments on crows show that young birds make long flights unguided.

➤ THE HOMING flight of pigeons and the autumnal and spring migrations of many other kinds of birds, often considered similar phenomena because both involve the unerring finding of a distant goal, are in reality direct opposites, Prof. William Rowan of the University of Alberta declares. (*Science*, Aug. 24.) Prof. Rowan is well known as the first scientist who discovered that the decreasing length of daylight hours is the physiological "trigger" that sets birds off on their long flights southward as winter approaches.

When a pigeon flies home, he points out, it really is going home—that is, to where the nest is. Pigeons never migrate. When migrating birds fly south in autumn they are turning their backs on home. Even when they come back in spring they do not usually return to the same home, in the sense of exactly the same spot. They come back to the same neighborhood or general region, and as a rule set up new homes.

It still leaves the nature of the migrating impulse, and especially the guides or landmarks by which the birds find their way, very much in the dark. The problem is made the more difficult by the fact that in many species the young of the season, which have never been south before, fly separately from, and often in advance of, the flocks of their elders, so that they have no experienced guides with them. Yet even the antarctic penguins, which migrate northward by swimming when the southern hemisphere winter closes in, reach their rookeries on the shores of South America through hundreds of miles of murky water.

Prof. Rowan relates an experiment he undertook with young crows a few years ago:

"On Nov. 9, 1940, approximately a month after the last resident crow had gone south, I liberated 54 young crows of the year near Edmonton, Alberta, from the area on which they had been hatched and subsequently trapped as juveniles in July and August. They were merely held in a spacious flying cage during the intervening period; no adults were with them.

"By Nov. 20 over 50% had been retaken, the farthest 250 miles southeast of the point of liberation on a line directly joining Edmonton and central Oklahoma, the wintering ground of 95% of Alberta crows. None of the birds recovered had deviated materially from this line and some of them were traveling at 50 miles per day, a remarkable rate for crows. The temperature was below zero Fahrenheit and the ground blanketed with snow."

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ENGINEERING

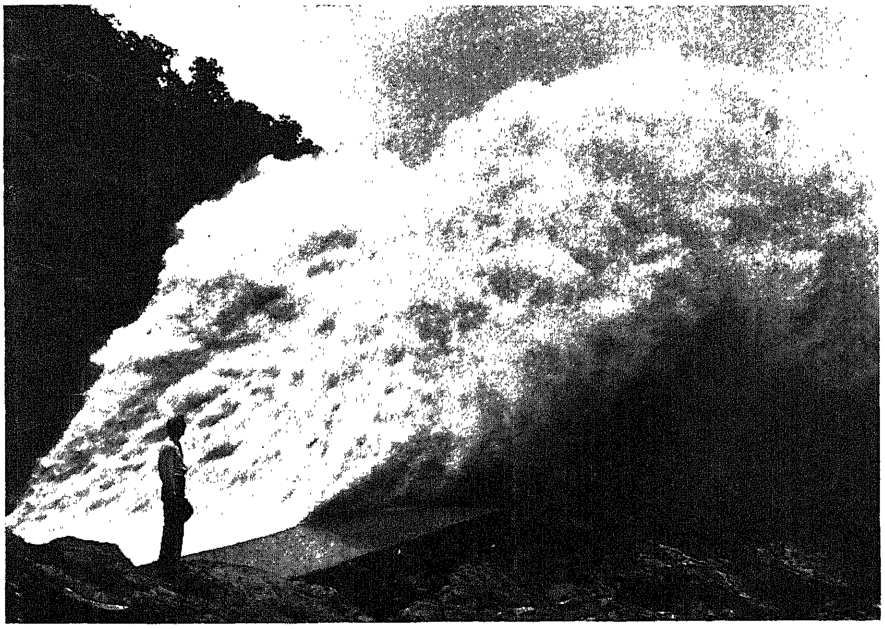
TVA's Newest Dam Performs Satisfactorily

See Front Cover

➤ TESTS were made on Fontana dam's spillway tunnels, shown on the front cover of this SCIENCE NEWS LETTER, over a three-hour period by spilling about 2,400 acre-feet of water at varying rates of discharge up to 20,000 cubic feet per second. Maximum design capacity is 200,000 cfs. The Fontana spillway is unique in many respects. Unlike a conventional spillway which discharges an overflow down the face of the dam, the Fontana spillway consists of a pair of parallel tunnels drilled through the solid rock of the mountainside which forms the east abutment of the dam. Each tunnel is 34 feet in diameter and approximately 1,000 feet long. The spillway crest at the entrance to the tunnels is at elevation 1675 and the outlets, several hundred yards downstream from the dam, are at elevation 1270. Each tunnel is intersected by a horizontal sluice tunnel at elevation 1590. At the height of the discharge during the test, water raced through the spillway tunnels at about 100 feet per second (around 70 miles an hour). On hitting the huge "bucket" deflectors at the tunnel portals, the water shot more than 100 feet into the air and spread in a fan-shaped spray extending 400 feet downstream. The action of the water on the river bed moved, as was expected, about 14,000 cubic yards of rock. Wind velocities up to 40 miles an hour were recorded in the gorge. Prior to construction of Fontana Dam, exhaustive tests on scale models were conducted at the TVA hydraulic laboratory at Norris to determine the feasibility of the unique spillway.

Science News Letter, September 1, 1945

The *drone-fly* is so named because it resembles the drone honey bee in appearance.



EXCESS POWER—Shooting out from Fontana's spillways, excess waters from Tennessee Valley Authority's newest dam are dispersed into a vast spray to reduce erosion.

AERONAUTICS-VOLCANOLOGY

Eruption Seen from Air

Helicopter over Paricutin enables geologists to make inspections in a few minutes that otherwise would have required many hours of climbing.

By CHRISTINA BUECHNER

➤ AS THE first woman to fly in a helicopter over the Mexican volcano Paracutin near Uruapan, this correspondent had a feeling of viewing very closely a natural drama from a grandstand seat in a show window.

There was no feeling of danger in sitting in the transparent bulge of the cockpit while Flight Officer Roy P. Beer buzzed the crater in the Army's hovering helicopter R6A, one of the many flights made during two weeks of exploration that simultaneously tested this unusual craft's performance at high altitude and explored the erupting volcano. There was so much of interest to see that there was no time for feeling afraid.

Our take-off was from the helicopter camp just beyond where the lava ceased to flow some months ago after engulfing the little town of San Juan Parangaricutiro, leaving only the steeple of the church in sight. The helicopter needs only a little clear space to land and take off. From this 7,200 feet above sea level, the helicopter rose to 1,500 feet above the crater which rises a thousand feet above what was merely a cornfield from which the volcano burst forth 2½ years ago.

This was considered by the officers of the Air Technical Service Command of Wright Field, Ohio, in charge of the aeronautical aspects of the expedition, as very satisfactory flying for a helicopter that was built to operate at lower altitudes.

Idling over the volcano and its lava beds, the helicopter has carried the American and Mexican volcanologists on flights that in several cases allowed prompt observation and study of new volcanic activity that would have ceased before the areas could have been reached tortuously on foot. Several landings were made near such newly active areas and the geologists were able to make inspections in a few minutes that otherwise would have required many hours of climbing.

Around the jagged and sometimes still warm lava beds the convection currents are strong, the air is bumpy and flight is turbulent.

Because of the rainy season less than half of the daylight hours have been suitable for observations during approximately two weeks that the expedition has been at the volcano. There have been more than 30 hours of flying with about 60 flights. Forty of these gave the geologists close views of the crater, and many times the pilot dropped down to within 300 feet of the crater's rim.

The scientists who did most of the observing were: Dr. Ezequiel Ordonez, leading Mexican geologist, Dr. L. C. Graton of Harvard, and Dr. W. F. Foshag of the U. S. Geological Survey and U. S. National Museum.

"Flying in the helicopter was one of the greatest experiences of my life," white-haired Dr. Ordonez told me. "I never really saw the volcano until I saw it from this slowly moving aircraft."

It was Dr. Ordonez who arrived at the volcano within 48 hours after it was born and who has spent many months observing it since.

Still and motion pictures, mostly in color, have been used to map the interesting structure that can best be seen from the air. Unusual lava flow formations, unsuspected from the ground even when crossed laboriously on foot, have been studied. The helicopter was able to come down within a few tens of feet over the rugged lava and sharply circle the point under observation. Conventional airplanes would have traveled too fast to allow such observations.

Helicopter data acquired on this expedition will permit more efficient operation of helicopters in the China-Burma-India theater, according to Capt. George Colchagoff, commanding officer of the Air Technical Service Command expedition. Helicopter experts of the Army were aided by Igor Sikorsky, inventor of the helicopter, and Ralph Alex, helicopter designer, who were both members of the expedition.

The helicopter will be flown to Mexico City and then dismantled and packed for the return trip aboard the same cargo C47 plane in which it was transported to Mexico from Wright Field.

Living in rough dwellings and Army tents, the expedition feasted on an unusual mixture of native Mexican food and Army C rations. A Trascan woman from the region cooked for the party and the menu consisted of local dishes built around the Army issue.

The American scientist who has been hunting for lightning in the eruption of Paricutin, Mexico's volcano, had his waiting rewarded when at least a hundred lightning flashes occurred within two hours in the Paricutin cone of eruption.

Dr. O. H. Gish of the Carnegie Institution of Washington found some of these were mere sparks and others were two-thirds of the visible height of the cone or about 800 to 900 feet in length. Quite a few of the lightning flashes were in the crater or on the cone. Some of the short ones were in the clouds, and some of the flashes were horizontal and others were at an angle.

These lightning observations will be studied because of their relationship to lightning conditions met with by airplanes in storm clouds. Both from the standpoint of air transport and the weather these new observations will be interesting, and Dr. Gish will report his findings to the U. S. Weather Bureau upon his return to the United States.

Within five miles of the volcano's cone, the ash from the volcano is too thick to allow any plants to grow from seed, Dr. W. A. Eggler of Central Michigan College, and his associates, have found as a result of a survey to determine what plants survived and what plants are returning to the volcano-devastated region.

In the area of thick ash only those continue to grow that have well-developed roots or underground stems. Such plants can grow up through the ash.

The trees that survived best under the blanket of fine dusty material blown out of the volcano are oak and madrona, with pine somewhat less hardy. Such trees are found within a mile of the volcano. When the ash is as much as ten feet thick, trees will nevertheless survive, although they look sickly.

Prickly poppy is growing up from its roots through the earth in the old corn fields and so is grass.

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Cotton production in southern Brazil has developed faster than in any other major cotton-growing section in the world; from an average of 40,000 bales in the five year period ended in 1930, production has now increased to over 2,000,000 bales.

JAP CYCLOTRON—Japanese scientists and laboratory workers at the Institute for Physical Research, Tokyo, with the cyclotron they built.

PHYSICS

Japs Have Cyclotron

Is copy of the one at the University of California. Scientists in Tokyo in 1940 discovered neptunium, one of new elements used in work on our atomic bomb.

➤ THE JAPANESE, as well as the Germans, during the war had their own program of atomic research, similar to the program that in the United States led to the development of the new atomic bomb. In 1940, Japanese scientists announced discovery of element 93, one of the new elements used in making the atomic bomb in the United States.

In 1938, in Tokyo, a giant cyclotron was nearing completion which was a duplicate of the one under construction at the University of California. It was intended to be one of the largest and most powerful in the world.

A 210-ton electromagnet had been installed, marking the halfway point in the construction of the cyclotron. It was expected to develop 20,000,000 volts.

Money for the Japanese atom smasher was made available by the Society for the Advancement of Science when an older 3,000,000-volt cyclotron was declared inadequate for their atomic research.

In charge of the new cyclotron was Dr. Yoshio Nishina, of the Institute of Physical and Chemical Research in Tokyo. Dr. Nishina was one of a research team of five Japanese scientists who in June, 1940, announced the manufacture of the element 93, now named neptunium. Other scientists in the group were T. Yasaki, H. Ezoe, K. Kimura and M. Ikawa.

They made their neptunium by bombardment of uranium with fast neutrons. Announcement of this Japanese achievement was made in the United States in the same issue of the *Physical Review* which contained details of the discovery in Berkeley, Calif., of the element 94, now called plutonium, and positive identification of the element 93.

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The value of *vitamin C* in tomatoes closely parallels the amount of sunlight received by the plant for about two weeks before harvest.

GENERAL SCIENCE

Make Knowledge Available To People, It Is Advised

➤ SCIENTISTS and other educators were advised to come out of their ivory towers and make their teachings available to all the people, in an address by Dr. William Seifriz, of the University of Pennsylvania, speaking in New York before the Sixth Conference on Science, Philosophy and Religion.

American scientists, he said, have been inclined to feel that the publicizing of the teachings of scholars is undignified and that to leave the ivory tower for the world of ordinary people is a betrayal of one's class.

"Education," he said, "must be both liberal and free, free of influence from the outside and free of propaganda from within, and above all free of political and financial control. These basic principles need not deprive education of the right to sell its wares.

"When one considers the tremendous efforts made and moneys spent by big business, by politics, by the press, and by religion to maintain position and increase power, the university becomes a very feeble competitor indeed.

"I do not recommend pressure advertising, but greater effort should be made to bring the teachings of the university to the people. This can best be done by having the people come to the university, but the university can also go to the people, through the press and the lecture."

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PUBLIC HEALTH

Americans Gave 50% More To Polio Fund This Year

➤ THE AMERICAN people gave 50% more money to the National Foundation for Infantile Paralysis in 1945 than in 1944.

Contributions to the 1945 March of Dimes totalled $16,589,874. The 1944 contributions totalled $10,973,491, Basil O'Connor announced.

Though many may think of the foundation only during epidemic seasons and at the time of the March of Dimes, its work and that of its chapters goes on the year round. Half of the funds raised are used to finance research and a program of education to train new polio fighters. The other half is retained for services to infantile paralysis victims in and out of epidemic seasons.

Science News Letter, September 1, 1945

AGRICULTURE

Early-Cut Hay Best For Milk Production

➤ LARGEST amount of milk is produced on hay cut at the full-bloom stage, it has been found in experiments at Cornell University.

Early-cut timothy produced 95% as much milk, and the late cut only 90% as much.

Not only does hay made at the full-bloom stage of the grass have the greater milk-producing value, but it also has the greatest total yield to the acre—2.56 tons for the season as compared with 2.32 tons for the early cutting and 2.53 tons for the late cutting.

The three hays were graded after curing. The early-cut molded during the barn-curing process; the medium cut, or full-bloom, was rated No. 1, and the late-cut, or seed stage, as No. 3. The scientists observed, however, that the cows ate larger amounts of the moldy hay than they did of the late cutting, and produced more milk.

Chemical studies were also carried out, showing that the earliest two cuttings retain a high carotene content after several months—enough so that six to nine pounds per day of the hay would furnish sufficient vitamin A value to insure successful reproduction in cows. In contrast, about 30 pounds of the late-cut timothy would be required for successful calving.

The study is being repeated before final conclusions are drawn.

Much of the hay harvested and fed in New York and Northeastern states is made from timothy and mixed grasses.

Science News Letter, September 1, 1945

ORDNANCE

Glass Armor Protected American Seamen

➤ GLASS armor sounds like something out of the Arabian Nights or the tales of King Arthur's Round Table; nevertheless it was extensively used in actual combat by the Navy during the recent war, and was also worn to some extent in combat ashore by the Marines. The story, hitherto held restricted, has now been released by the Navy.

The glass is in the form of exceedingly tough spun-glass fibers woven into fabric and impregnated with a hard plastic. It makes plates that are claimed to give better protection, weight for weight, than steel. It has the considerable advantage over steel of not throwing off injurious splinters if struck by fragments of exploding projectiles. The plates are placed in pockets in life vests or other garments, and may be jettisoned at will.

Although the new armor material has been used mostly by the Navy, it was originally an Army development. It was invented by Brig. Gen. G. F. Dorion, Q.M.C., and has been given the name Doron in his honor.

Science News Letter, September 1, 1945

PUBLIC HEALTH

Check Child's Health Before School Opens

➤ IN THESE last few days before school opens, parents who have not already done so should make haste to have the children's health checked by the family doctor, or to finish carrying out his earlier advice for correction of health defects.

"Every child should enter school in September with a clean bill of health, with no handicap to deter him in his studies or make him a health hazard to other children," the Indiana State Medical Society has declared. Other health and medical authorities will agree.

If the children have not yet been immunized against diphtheria and whooping cough and vaccinated against smallpox, these protective measures should be started without delay. The children may have had these immunizations during their first year of life. The doctor may think it wise, however, to repeat the smallpox vaccination and to give another Schick test to learn whether the child still has good protection against diphtheria. This is particularly important for the child entering school for the first time, since he is the one most apt to catch any disease which another child in school may have.

The doctor will probably weigh the child and measure his height. These will be checked against the child's own record of the previous year, to see whether he is growing and gaining as he should. Comparisons of weight and height between one child and another of the same age do not mean as much, because children, like grown-ups, vary in build.

Eyesight and hearing, of course, will be checked to make sure the child is not being handicapped at school by inability to see the blackboard or lesson books or to hear the teacher clearly. Many a child has been labelled stupid or disobedient when his trouble was an unsuspected case of poor eyesight or poor hearing.

Science News Letter, September 1, 1945

MEDICINE

Rh Blood Factor Is Absent in Chimpanzees

➤ THE RH blood factor, which in humans may cause danger and even death in the case of repeated transfusions into the veins of individuals not having it, was absent in 15 chimpanzees tested by Dr. Alexander S. Wiener, of the Office of the Chief Medical Examiner, New York City, and Dr. Marjorie Wade, Yerkes Laboratories for Primate Biology, Orange Park, Fla.

The Rh blood factor was so named by the scientists who identified it in the blood of rhesus monkeys. Apparently all rhesus monkeys have it. Different races of mankind vary somewhat in the proportion having the Rh factor; in the United States about 85 out of a hundred are Rh positive and the other 15 have the Rh negative incompatible blood.

No theory is proposed by Drs. Wiener and Wade to account for the fact that the man-like ape, the chimpanzee, should be Rh negative.

Science News Letter, September 1, 1945

INVENTION

Sleeping Cars May Have Nothing But Lower Berths

➤ A SLEEPING-CAR with as many berths as the present Pullmans yet without any of the unpopular "uppers" is the novel invention on which patent 2,382,402 was granted to T. de Roode of New York City. The seats are single, instead of double as in the present-type sleepers. At night they are folded down in such a manner as to provide two parallel rows of berths on either side of the central aisle; but these are in a staggered position.

Since most persons are wider in the middle than they are at head and feet, each berth is built with a wide middle and narrow ends, so that the staggered construction is calculated to give a maximum amount of accommodation with a minimum waste of space.

Upper berths (at least one row of them) may also be lowered from the wall if desired; in this case the car simply gains in number of passengers who may be carried.

Science News Letter, September 1, 1945

CE FIELDS

ENTOMOLOGY

Mosquitoes Now Made To Shine in the Dark

➤ MOSQUITOES aren't being given a break at all any more. First they produce improved repellents, that drive them off a tempting area of exposed human skin with a disappointed "zing!" Then they turn up DDT, which is sure death in submicroscopic doses. Now they spray them with stuff that makes them shine in the dark, so their nefarious goings and comings can be traced.

Not that the pests are being crossed with lightning-bugs. Neither is their glow intended for the suffering individual 'skeeter-slapper on porch or lawn. The new trick is primarily for the use of mosquito-fighting scientists, who want to find out which way and how far the insects fly.

The mosquitoes are marked for later identification by spraying or dusting them with fluorescent compounds—those chemicals that shine with a glimmering light of their own when irradiated with the "invisible light" of ultraviolet rays. Three different compounds have been tested so far, by Dr. John W. Zukel of the U. S. Public Health Service; they make the mosquitoes fluoresce with blue, red and green glows. When mosquitoes thus marked are later recaptured, it is very easy to identify them and to tell where they came from.

Science News Letter, September 1, 1945

RADIO

Television Broadcasts Unaffected by Plane Crash

➤ SCHEDULED television broadcasts from the tower of the Empire State building in New York were unaffected by the recent crash of an Army plane into the building below the tower, and there was no injury to the new installation, just completed, to be used in conducting field tests to study problems faced in employing higher frequencies in television broadcasting. A regular broadcast was on the air two hours after the crash, and no special difficulties have shown up since.

Scaffolding about the tower used in the erection of the new television transmitter, atop the building 1,250 feet above the street, had been removed only a day or two before the crash, the installation being completed but not yet in use. When testing starts it will be conducted by the Radio Corporation of America in cooperation with the National Broadcasting Company, which operates the regularly scheduled television programs. The tests will in no way interfere with the regular broadcasts.

The new installation, to study the problems of using higher frequencies in television broadcasting, will employ a new transmitter capable of developing five kilowatts of output power at 288 megacycles, a somewhat higher frequency than now assigned by the Federal Communications Commission for commercial television transmission.

The primary purpose of the new station is to ascertain the service area of a transmitter operating in these higher frequencies. The present television audience in the area will be unable to pick up the test broadcasts which will be received only on specially-designed receivers in possession of the survey engineers.

Science News Letter, September 1, 1945

ENGINEERING

Petroleum Research Centers to Be Established

➤ A GIGANTIC science laboratory, housed in eight buildings, will soon be under construction in Linden, N. J., for the Standard Oil Development Company, and will contain, it is claimed, the world's most modern and extensive research equipment in the oil industry. One building for similar work will be erected for the same company at Baton Rouge, La.

The new laboratories at both locations will be used not only for developing improved products for oil and methods for producing them but additional extensive work on extending sources of supply of oil products will be carried out.

This latter work will include production of oil from natural gas, gasification of coal, production of oil from coal and from other carbonaceous deposits such as oil shale.

Basic studies will also be conducted on the application of catalytic processes to derive chemical raw materials from petroleum. One section of the new plant will be devoted to research on extremely low-temperature polymerization, important in the field of new plastics. A process of this nature is the basis of the synthetic butyl rubber, which is a product superior to natural rubber for inner tubes in automobile tires and for certain other purposes.

Science News Letter, September 1, 1945

RESOURCES

Creosote-Pitch Mixture Used as Fuel in England

➤ A COAL TAR fuel widely used in the United Kingdom during the war years, and still in use, has been described by the Ministry of Fuel and Power in London. It is a creosote-pitch mixture, with about equal parts of the two substances, and is made entirely from English-produced materials.

More than 500,000 tons of this fuel are now being consumed annually in Great Britain, and this represents approximately two-fifths of the total amount of liquid fuel at present burnt in English industry. It is similar to fuels used by some plants before the war, and even during World War I. This, however, is not to be regarded, the Ministry states, as a "second best" fuel, to be tolerated only until such time as other liquid fuels become available.

The 50-50 creosote-pitch fuel mixture is homogeneous, and the so-called free carbon consists of microscopic particles of resinous material, which, when the fuel is held in storage at from 80 to 90 degrees Fahrenheit, remain permanently dispersed.

Heating equipment formerly used with other liquid fuels can be used with this coal tar product, provided certain minor adjustments are made. If formerly used with petroleum fuels, the equipment must be thoroughly drained and flushed with hot creosote oil, because if petroleum fuels are allowed to mix with tar fuels, the resinous matter in the latter is immediately precipitated.

Science News Letter, September 1, 1945

PUBLIC HEALTH

Increase in Polio Cases Slight; Peak May Be Near

➤ INFANTILE paralysis cases increased only slightly during the week ending Aug. 18, giving rise to the hope that the peak of cases for this season may be near or even passed. The total number reported to the U. S. Public Health Service was 692. This represents an increase of only 21 over the previous week's total, when cases jumped by 197 to reach a total of 671. The total number of cases since Jan. 1 is 4,276, compared to 6,262 for the same period last year.

States reporting increases this past week were New York, New Jersey, Pennsylvania, Illinois, Virginia, Tennessee and Texas.

Science News Letter, September 1, 1945

ASTRONOMY

Planets Rise Late

The first to arise, Mars, appears around midnight. Saturn appears in the east about 1:00 a.m. Venus comes up about three hours before sunrise, Mercury at dawn.

By JAMES STOKLEY

➤ TO SEE a planet during the month of September, moderately late hours will be required. The first to arise, Mars, appears in the northeast around midnight, after which it will be seen for the rest of the night. Red in color, and equal to a first magnitude star, it will not be difficult to find.

Because of its late rising, it does not manage to get on the accompanying maps, which show the appearance of the sky at about 11:00 p.m., your own kind of war time, on Sept. 1 and about 10:00 p.m. at the middle of the month. They can, however, be used earlier in the evening without difficulty. Simply remember that the stars, like the sun, move across the sky from east to west. Therefore, a little earlier than the times given, the whole group of stars indicated will be shifted a little to the east. Stars shown on the maps as low in the east may not then have arisen, while others that are not shown will still be on view in the west. Those high in the south will look pretty much the same.

The brightest of the stars to be seen these evenings is Vega, high in the west in the figure of Lyra, the lyre. Directly overhead is the Northern Cross, otherwise known as Cygnus, the swan, with bright Deneb at the top of the cross, toward the north. Below Cygnus, to the south, is Aquila, the eagle, with Altair, another star of the first magnitude.

Three Others Indicated

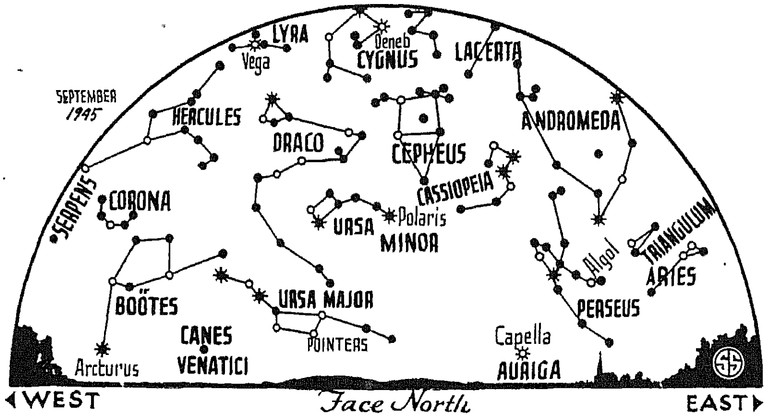
Three other first magnitude stars are indicated on the maps. As they are all near the horizon, they look fainter than they do when higher, on account of the absorption by the greater length of the earth's atmosphere through which their light has to pass. Low in the south is Fomalhaut, in Piscis Austrinus, the southern fish. In the west we see Arcturus, in Bootes, the bear-driver, while coming up in the northeast is Capella, in Auriga, the charioteer.

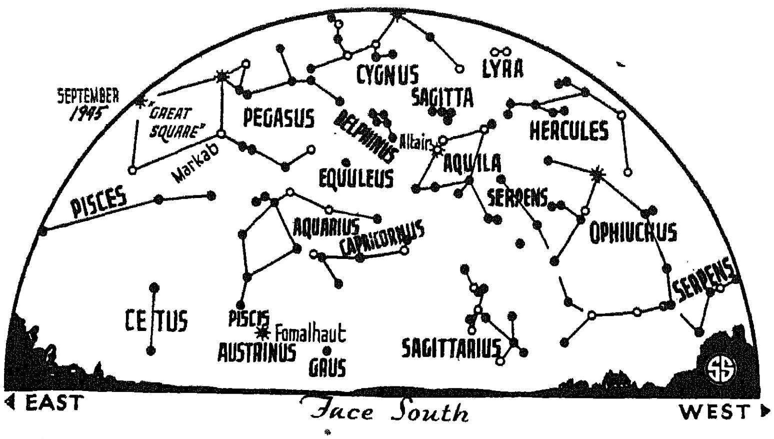
Though not of the first magnitude, another easily recognized stellar figure now in a good position is the Great Square in Pegasus, the winged horse, seen high in the east. Just below Lyra, in the west, is Hercules, the strong man, some of the stars of which form a letter H, while others see it as a butterfly. Directly under Cygnus, to the south, is the little figure of Delphinus, the dolphin, sometimes known as Job's coffin. And near it, to the right, just over Altair, is another of the smallest constellations, Sagitta, the arrow, a group which has no known connection with Sagittarius, the archer, low in the south.

In the north the Great Dipper is nearly at its lowest position of the year. Directly above it is the winding line of stars that make up Draco, the dragon, twisting themselves around the Little Dipper, which has the pole star at the end of its handle. To the right of the pole star is Cassiopeia, the queen, shaped like a W tilted to the left. And between Cassiopeia and Ursa Minor, of which the Little Dipper is part, is Cepheus, the king.

After Mars, the next planet to appear these September nights is Saturn, which is in the group of Gemini, the twins, appearing in the east about 1:00 a.m. Of magnitude 0.4, it is appreciably brighter than Mars. Venus, brightest of all, with magnitude minus 3.4, comes up in the east about three hours before sunrise, in Leo, the lion. About Sept. 6 Mercury, then of zero magnitude, reaches its greatest distance west of the sun when at sunrise it is about 16 degrees above the horizon. This means that around this date you may be able to get a glimpse of it, low in the east, as dawn is breaking.

Besides being the brightest star now seen, Vega has other points of interest. For one thing, it will be the pole star about 14,000 A.D., as it was around 12,000 B.C. This is an effect of the movement known as precession (sometimes





☼ ✱ ○ ● SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS misprinted procession) of the equinoxes, a slow wabbling movement of the earth's axis by which in the course of nearly 26,000 years it traces out a large circle in the sky, bringing various stars into the position of the pole star.

In Lyra several interesting objects are revealed by the telescope. With Vega there are two fainter stars which form a little equilateral triangle. The most northerly one is epsilon Lyrae, sometimes called the "double double." To a very keen eye what seems at first a single star appears as two, while the telescope shows that each member of the pair is itself double. In Lyra also is the famous Ring nebula, a globe of glowing gas which looks, through the telescope, like a smoke ring in the sky. It cannot be seen at all with the naked eye.

Also close to Vega, just across the border in the next-door constellation of Hercules, is the place where we are going. That is, the entire solar system—sun, planets, and all—are moving through space toward this part of the sky at a speed of 12.2 miles per second. The result of this, incidentally, is that the movement of the earth is in a helix, or corkscrew, and not in a plane circle. This is a fact that has been well-known to astronomers for years, and is fully described in many textbooks, although once in a while some uninformed person suddenly finds it out and thinks he has made a great discovery!

To the south is the figure of Sagittarius, the archer, which has some points of interest, because it is the direction of the center of our celestial city—the Milky Way, or galaxy. All the stars that we see, and a vast number that are only revealed by the telescope, form a system that has the shape of a bun, or rather thick watch, so large that light takes about 100,000 years to cross it. This, even though the speed of light is 186,000 miles every second. The center, toward Sagittarius, is about 30,000 light years away.

The glowing path of light that we call the Milky Way is simply the edge of the galaxy, for when we look toward it we see more stars than when we look to the sides. But vast though this galaxy is, it is only one of many such systems in the sky, which again makes us realize the minute part of creation that is occupied by man and his works.

Celestial Time Table for September

Sept.	EWT	
2	6:57 a.m.	Moon passes Saturn
3	6:41 a.m.	Moon passes Venus
4	5.49 p.m.	Moon passes Mercury
6	8:00 a.m.	Mercury farthest west of sun
	9:43 a.m.	New moon
7	8:04 p.m.	Moon passes Jupiter
10	8:00 p.m.	Moon farthest, distance 252,000 miles
14	1:38 p.m.	Moon in first quarter
21	4:46 p.m.	Full moon
22	midnight	Moon nearest, distance 223,500 miles
23	5:50 a.m.	Sun crosses equator, autumn commences
28	7:24 a.m.	Moon in last quarter
	7:39 p.m.	Moon passes Mars
29	4:26 p.m.	Moon passes Saturn
30	7:00 p.m.	Moon passes Mercury

Subtract one hour for CWT, two hours for MWT, and three for PWT.

Science News Letter, September 1, 1945

MEDICINE

Sailors and Marines Used Cold Cream and Lipstick

➤ HARDBOILED sailors on our fighting ships used cold cream, and Marines on sun-scorched Pacific isles carried lipsticks. These now-it-can-be-told secrets came out in the course of a radio address by Rear Adm. Harold W. Smith, chief of the research division in the Navy's Bureau of Medicine and Surgery.

However, the cold cream was anything but a boudoir luxury. It was a specially developed protection against the painful type of injury known as flash burn, which our men risked whenever they went into action stripped to the waist.

Similarly, the lipstick wasn't an item you'd be likely to find in any lady's handbag. Its color is a most unglamorous gray-brown—but it is an effective preventive of the painful sunburn that afflicts men's mouths and noses where the sun pours on an excess of "hot" ultraviolet rays.

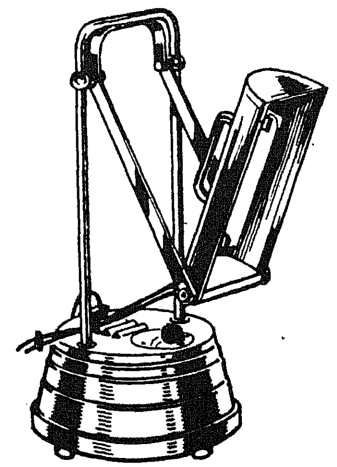
These, of course, are relatively minor products of naval medical research, Admiral Smith explained. As examples of larger undertakings that saved many lives under strenuous field conditions he cited the whole prepared blood program, the anti-G suits that kept flyers from "blacking out" at the bottom of a high-speed dive, and the emergency kits with which all life rafts are now equipped.

Admiral Smith spoke as guest of Science Service on the CBS public service feature "Adventures in Science."

Science News Letter, September 1, 1945

Tomatoes, pole beans, cucumbers and squash can be trained to the garden fence.

Millions of pounds of a little known chemical, *phthalic anhydride,* is used in normal times in the tough enamel automobile coatings; it is a while crystalline powder made by oxidizing naphthalene, the familiar moth repellent.



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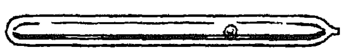
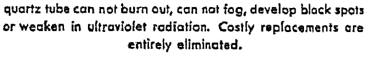


Sun-Kraft, "No filament, burn-out-proof" super transparent quartz tube can not burn out, can not fog, develop black spots or weaken in ultraviolet radiation. Costly replacements are entirely eliminated.



Conventional type electrode or filament activated tube. Deteriorates quickly because of the fused in metal. It will develop black spots fast, reducing ultraviolet radiation and eventually burning out entirely, necessitating costly replacements.

SEND FOR FREE ILLUSTRATED BOOKLET "HOW TO USE YOUR SUN-KRAFT"

Do You Know?

The color and flavor of *fats* are not of nutritive significance.

Infra-red light is now used in drying the finish on furniture.

The black seeds of the male *peony* were once recommended for sufferers from nightmares.

During the summer a square meter of *leaf* surface evaporates about fifty grams of water per hour.

Crooked streams retard the rate of flow of water from 30% to 60%; vegetation growing in the stream bed also retards flow greatly.

It was not until 1791 that the scientist *Dalton,* himself colorblind, described the now familiar phenomenon of red-green colorblindness.

When several electric *eels* are together, one or two will discharge their electricity to paralyze food for all, thus allowing the others to keep their electricity in reserve.

Cattail fluff, from the ordinary swamp cattail, is now used in large quantities as a stuffing in upholstery and for other purposes; it is buoyant and well suited for life-saving equipment.

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ENTOMOLOGY

NATURE RAMBLINGS

by Frank Thone

Alien Ally

➤ INSECTS introduced from foreign lands are almost invariably regarded as pests. We automatically think of them in terms of Japanese beetle, Oriental fruit moth, Hessian fly, European corn borer and similar terms. It is no wonder, therefore, that so far as insects are concerned we all tend to be xenophobes, and look upon aliens only as undesirable aliens.

This is not necessarily the case, however. Foreign insect species may be harmless or even useful, just like foreign-born human beings. They do not irritate or annoy us, they do us no harm, and after a while we come to think of them as having been here "always"—like Mayflower descendants.

A noteworthy case of this kind, conspicuous because the creature itself is so conspicuous when you see it at all, is that of the Oriental mantis. Ordinarily we seldom see this big, rather awesome-looking insect; but when nights begin to become cool in autumn the species tends to migrate, and many specimens blunder aimlessly into cities and are thus noticed and captured.

The Oriental mantis is a formidable object to look at, even for us relatively gigantic human beings. It must be a veritable death-ogre in the insect world, for it preys on other insects as a tiger does on deer or goats, and for its size is even more bloodthirsty. The female even devours her mate, so that the wandering individuals we see are practically always of the deadlier sex.

The mantis' mode of operation is direct and simple—and a bit spine-chilling to watch. She waits motionless while her unsuspecting prey—a grasshopper, perhaps—wanders within range of those powerful, spine-armed forelegs that are usually held in an attitude of seeming prayer. Then those tongs of doom snap on it like a trap, and despite all struggles the mantis proceeds to gnaw deliberately into the doomed victim's vitals. You find yourself beginning to feel sorry for the grasshopper, even though the front of your brain tells you that the 'hopper is your enemy and the mantis your ally.

How and when the Oriental mantis got to this country nobody seems to know very exactly. It is native to eastern Asia, including Japan, and it is common in this country mainly along our own eastern seaboard. Probably it was introduced in the form of unhatched eggs, on imported nursery stock. At any rate, it has largely displaced the much smaller native American mantis within the range it has taken over. Nobody cares much, for such effects as it has on the insect economy of the wild are on man's side of the fight. Except for the matter of relative size, it might be termed an insect Nisei.

Science News Letter, September 1, 1945

Fossil redwood cones have been discovered in the badlands of Dakota.

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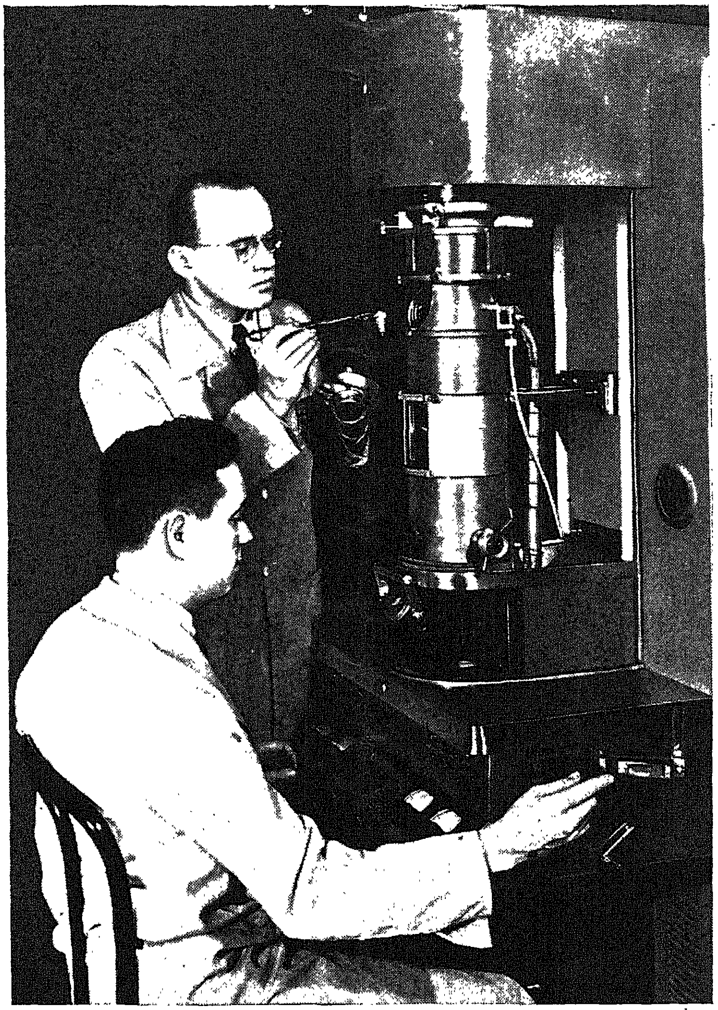

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MEDICINE

Cancer Research Grant

$4,000,000 will provide for building and in part maintaining a projected cancer center in conjunction with New York's Memorial Hospital.

➤ A GRANT of $4,000,000 from the Alfred P. Sloan Foundation to provide for building and in part maintaining a projected Sloan-Kettering Institute for Cancer Research was announced by Alfred P. Sloan, Jr., sponsor of the foundation and also chairman of General Motors. The research center will be organized in conjunction with New York City's Memorial Hospital, which specializes exclusively in the treatment of cancer.

It is estimated that the building itself will cost $2,000,000. To be located squarely in the middle of Memorial Cancer Center, on property now owned by Memorial Hospital, the building will be especially designed for research and will be self-contained in all its various research functions.

A sum of $200,000 will be provided each year for ten years to help defray operating costs. Dr. Charles F. Kettering, vice president and director of research for General Motors, will help supply the general types of techniques long employed in industrial scientific research.

Although part of the Memorial Cancer Center, the institute—which has no relationship to General Motors—will be operated by a separate board of trustees composed of men primarily interested in research. The funds entrusted to the charge of these Trustees can be used for no other purpose than research. All the clinical facilities and material of the other units of the center, however, will be available to the institute, R. G. Coombe, president of Memorial Hospital, stated.

When the expansion program of Memorial Hospital has been completed, Mr. Coombe said, from the center as a base the public may well expect to benefit through improved methods of prevention, diagnosis and treatment. Ultimately the cause of cancer may be found.

"The determination of the cause of cancer is one of the great unsolved problems of mankind," Mr. Sloan stated after announcing the grant. "The impact of the disease on the human race is appalling and, unfortunately, its magnitude too little appreciated. One out of every nine succumbs to its ravages."

The same broad principles of organized industrial research can be adapted to the study of cancer, both Mr. Sloan and Dr. Kettering believe, and the current acceleration of scientific knowledge provides an unusual opportunity for a determined all-out attack on cancer.

Science News Letter, September 1, 1945

VIBRATION

Fatigue Testing

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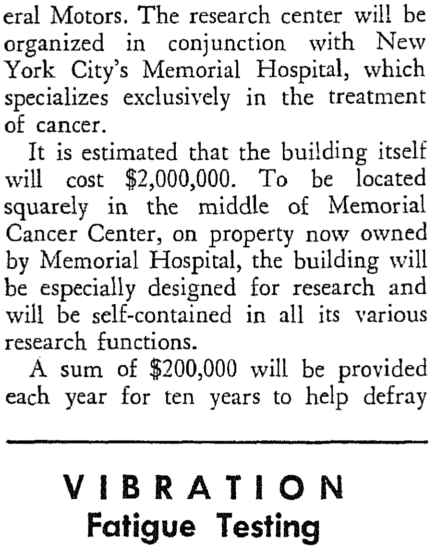

Model 100V in research laboratory of Carl Hussman Engineers, Inc., Chicago, makers of vibration control and stabilization devices.

ALL AMERICAN
Tool & Manufacturing Co.
1014 Fullerton Ave., Chicago (14)

INVENTION

Pulp-Mill Wastes Made Harmless to Aquatic Life

➤ A METHOD for making liquid wastes from paper-pulp mills harmless to fish and other aquatic life is covered by patent 2,382,010, granted to the estate of the late Paul Hodges, formerly of Crossett, Ark.

The principal offender in the class of pulp-mill effluents considered by Mr. Hodges' patent is known as sulfate soap; five parts of this in a million of water is known to kill fish. In the newly patented treatment the mill effluent is first run into a shallow pool, where fermentation with yeasts or molds breaks down the wood wastes and other organic compounds. Then the frothy mass is slowly trickled down over a series of concrete steps, where oxygen from the atmosphere can act on it. It falls into a second pool, where solid sediments gather on the bottom and can be removed. The liquid floating on top then trickles down another set of aerating steps, and by the time it reaches the bottom has lost practically all of its trouble-making contents.

Science News Letter, September 1, 1945

ENGINEERING

Hermetically-Sealed Buildings for Big Guns

➤ STORAGE of America's big guns, now silent, and other heavy artillery equipment, where rust, corrosion and dust cannot injure them, is a problem that may be solved by the construction of great hermetically-sealed metal containers to house them, in which the destructive air is replaced by an inert gas. This is the solution recommended by engineers of the U. S. Steel Corporation who devoted months of research and experiment to the problem.

The proposal is for a big welded steel container, resembling the Army Quonset hut. Many steel containers of this type have been constructed and are undergoing further analysis and study. After the equipment is placed in them the air, with its corroding factors of oxygen and moisture, will be replaced with nitrogen or other inert gas which should prevent deterioration over a long period of time.

Equipment so preserved will be ready for immediate use in case it is needed. The container will have to be opened with a welding or a burner's torch.

Science News Letter, September 1, 1945

FORECAST THE WEATHER

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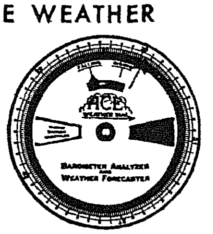

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• Off Press •

➤ THE FIRST book of a three-volume set for electrical engineers and students, the FUNDAMENTALS OF ELECTROMAGNETIC ENGINEERING, by Dr. W. P. King, is now off the press. It covers high frequency transmission lines, antennas, wave guides and wave propagation. It includes information given by the author in a pre-radar training course to Army officers. It is understandable for students with the proper background. (*McGraw*, $6)

Science News Letter, September 1, 1945

➤ THE STRENGTH of the Soviet Union rests upon her resources of land and minerals, and upon the dynamic character of her people, according to the geographical book by George B. Cressey, entitled the BASIS OF SOVIET STRENGTH. It is a readable volume, with maps and illustrations, containing authoritative information on Russian raw materials, agriculture, industries, racial backgrounds and regional characteristics. (*McGraw*, $3)

Science News Letter, September 1, 1945

● Just Off the Press ●

BUILDING CONSTRUCTION ESTIMATING—George H. Cooper—*McGraw*, 282 p., illus., $3. A textbook for technical and vocational schools.

THE COLUMBUS CLOCK—Willis I. Milham—*McClelland*, 34 p., paper, illus., $1.

ELECTRICAL COILS AND CONDUCTORS: Their Electrical Characteristics and Theory—Herbert Bristol Dwight—*McGraw*, 351 p., illus., $5.

ELECTROMAGNETIC ENGINEERING: Vol. I. Fundamentals—Ronold W. P. King—*McGraw*, 580 p., illus., $6. Radio Communication Series. Expanded from courses at the Cruft Memorial Laboratory.

EXTINCT AND VANISHING MAMMALS OF THE OLD WORLD—Francis Harper—*Am. Committee for Internat. Wild Life Protection*, 850 p., paper, illus., $4. Special Publication No. 12. Cloth ed., $5.

OLD PAPER SPECIMENS OF THREE CENTURIES—*Dave Webb Private Press*, 35 p., paper, $2.50. Ltd. ed. Contains 35 specimens of handmade paper.

POPULATIONS OF THE OTHER AMERICAN REPUBLICS BY MAJOR CIVIL DIVISIONS AND BY CITIES OF 5,000 OR MORE INHABITANTS—*Office of Inter-American Affairs*, 58 p., paper, free. Handbook of Latin American population data.

THE ROCKEFELLER FOUNDATION ANNUAL REPORT, 1944—*Rockefeller Foundation*, 344 p., paper, illus., free.

THERMODYNAMIC PROPERTIES OF AIR INCLUDING POLYTROPIC FUNCTIONS—Joseph H. Keenan and Joseph Kaye—*Wiley*, 73 p., $2.25.

WORKBOOK IN ELEMENTARY METEOROLOGY—Frederick L. Caudle—*McGraw*, 188 p., paper, illus., $1.24.

THE YEARBOOK OF PSYCHOANALYSIS, Vol. 1—A. A. Brill and others—*International Universities Press*, 370 p., $10.

Science News Letter, September 1, 1945

METALLURGY

Low-Temperature Process For Separating Magnesium

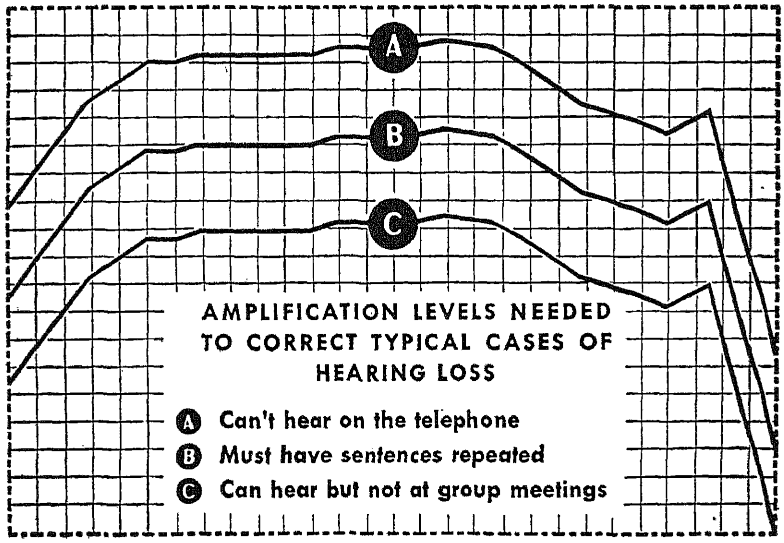
➤ HINT of possible postwar trends in light-weight motor car construction is contained in a patent issued to Henry Ford and two associates, E. E. Ensign of Ypsilanti and A. C. Quinn of Dearborn, Mich. The patent, No. 2,382,047, assigned to the Ford Motor Company, covers a low-pressure, low-temperature method for getting the light alloy metal, magnesium, out of its commoner ores.

Starting material for the process is preferably dolomite or other carbonate of magnesium. Magnesium oxide may also be used, but if it is, finely divided carbon must be added. The retort is heated up to a temperature between 2,000 and 2,500 degrees Fahrenheit, while air is pumped out until the pressure is only three millimeters of mercury—approximately only a thousandth of ordinary atmospheric pressure.

The carbon and oxygen are driven off in the forms of carbon monoxide, carbon dioxide and what the inventors call "R" carbon, while the magnesium is released as an uncombined element in vapor phase, which may be cooled to solid, crystalline form after being drawn into a different part of the apparatus.

Science News Letter, September 1, 1945

What Makes a Good Hearing Aid . . . No. 3 of a Series



AMPLIFICATION

● Any hearing aid worthy of the name should provide adequate amplification of sound to compensate for *varying* degrees of correctable hearing loss.

To illustrate—different levels of amplification that might be needed for three typical cases of hearing loss are charted above. For satisfactory hearing, "A" must set Volume Control higher than "B" . . . "B" higher than "C".

At each level of amplification, frequency response should remain essentially the same. A full range of tones and overtones should give body and clarity to sound. A tone discriminator should be available to cut down annoying low frequency sounds. Intensity of sudden noises should be automatically limited by proper design of the amplifier circuit to prevent transmission of such electronic overloads to the receiver.

The volume control should be engineered for smooth and continuous gradations of amplification to individual needs. Ample reserve output should be available to meet special hearing situations.

THE WESTERN ELECTRIC is one hearing aid that meets these essential amplification requirements.

THIS SERIES, BASED UPON RESEARCH CONDUCTED BY BELL TELEPHONE LABORATORIES IS PUBLISHED IN THE INTEREST OF THE HARD OF HEARING AND THEIR PHYSICIANS

Western Electric Hearing Aids

MADE TO BELL TELEPHONE STANDARDS

New Machines and Gadgets

TRANSMISSION photometer is an electric device that analyzes the composition of metals by reading a photographic plate of the metals' spectrum. It measures the density of the spectrum lines in the spectograph, thus showing the proportion of alloy in the metal.

Science News Letter, September 1, 1945

SIGNALING searchlight, a 12-inch unit used to send colored code messages, is housed in a drum-type casing on a trunnion bracket that pivots on a stationary base. It can withstand the roughest weather and severe repercussion. Nine words per minute can be sent with it.

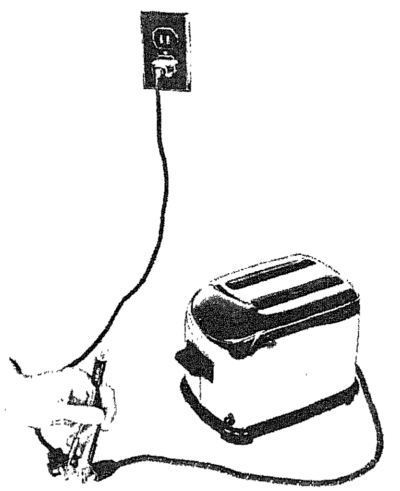
Science News Letter, September 1, 1945

DETACHABLE HEELS for shoes, to make home replacement of worn heels easy, are held in position by threaded machine screws against permanent lifts under the heel part of the shoes in which are threaded sleeves. The head of the screw is countersunk in the removable heel.

Science News Letter, September 1, 1945

POLARIZING microscope, that meets the requirements of most polarization microscopy, has an optical system containing Polaroid material in place of the usual calcite prism. It gives a noticeable increase in contrast in the image, it is claimed.

Science News Letter, September 1, 1945



CIRCUIT TESTER, vest-pocket size, has a tiny neon lamp on its top that glows when the two contact points are put in an electric circuit, as shown in the picture. The intensity of the glow indicates the circuit condition; no glow shows a dead line.

Science News Letter, September 1, 1945

ADJUSTABLE reflector, for a light suspended from the ceiling to permit concentration of light in any desired direction, is an ordinary umbrella-shaped reflector with a hole in its center that fits over a small globe on the supporting rod. The reflector is rotated on the globe as desired.

Science News Letter, September 1, 1945

BOX-LIKE device, somewhat bellows-shaped, to hold and help expel the contents of a shaving-cream or other collapsible tube, has two triangular and two rectangular sides. One of the latter is movable and hinged to the other at one end. When pressed it forces out the contents as needed.

Science News Letter, September 1, 1945

DENTAL COMPACT has a toothbrush within it that may be opened out by means of a pivoted joint in somewhat the same manner as the blade of a jackknife. Beside the compartment in the compact for the closed head of the brush is space for a small vial of dentifrice.

Science News Letter, September 1, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 274.*

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What did sailors and marines use cold cream and lipstick for? p. 139.

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Where published sources are used they are cited.

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CIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • SEPTEMBER 8, 1945

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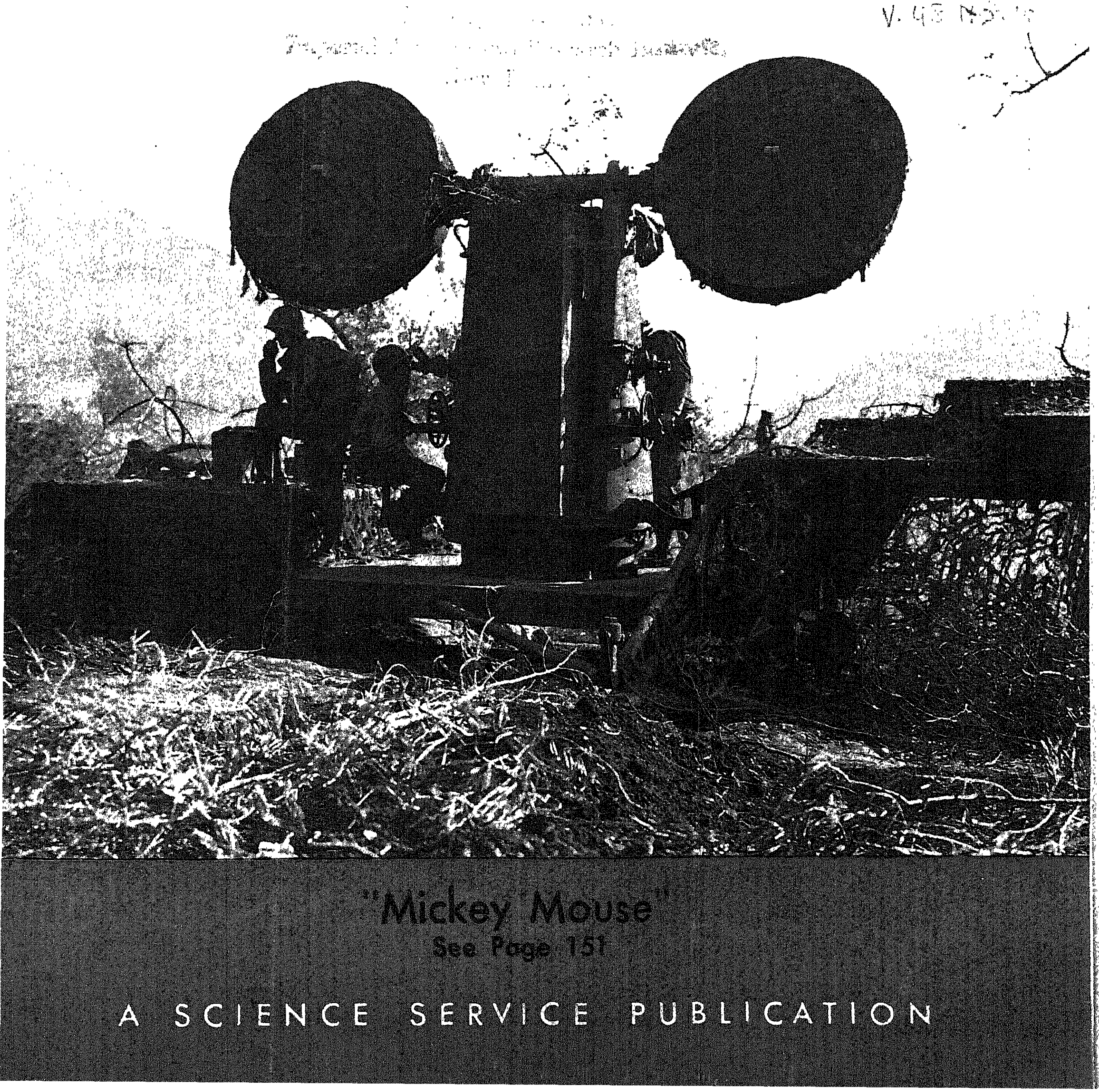

"Mickey Mouse"

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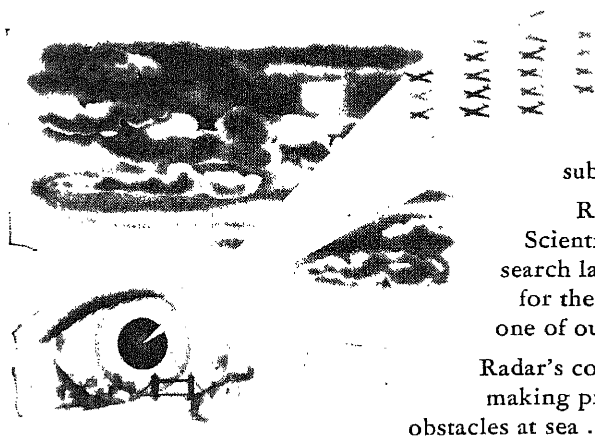
A SCIENCE SERVICE PUBLICATION

RCA's role in RADAR



The story of Radar—the magic beam that enabled the United States Navy to sink a Jap battleship eight miles away at night . . . that helped save England in her darkest hours by detecting enemy planes . . . that automatically aims guns and detects submarines . . . this whole story is now officially released.

RCA takes this opportunity to congratulate the Office of Scientific Research and Development, the Army and Navy research laboratories and all other elements of the radio industry for their splendid work in so perfecting Radar that it became one of our most powerful weapons in winning the war.

Radar's contributions in peacetime will be equally as great . . . in making private and commercial flying even safer . . . in detecting obstacles at sea . . . and in hundreds of other ways yet to be discovered.

As for our part in this great effort, we here list the major developments in Radar made by RCA

1932—RCA Laboratories originated micro-wave equipment, which later was used in successful radar experiments.

1934—Echoes were obtained with micro-wave equipment set up near Sandy Hook. This experiment showed for the first time the potentialities of micro-wave radar.

1935—An experimental micro-wave pulse radar system was developed by RCA Laboratories. It was demonstrated to the Army and Navy in 1936.

1936—A lower frequency high power radar was supplied to the Army by RCA.

1937—RCA micro-wave radar was used to scan the Philadelphia skyline with cathode ray indication essentially the same used in today's newest radar sets.

1937—RCA developed an airborne pulse radar. This equipment operated very satisfactorily for detecting obstacles such as mountains, and was also invaluable as an altimeter. It was demonstrated to the Army and Navy in 1937, and at their request was classified as "secret."

1938—RCA started development of a practical altimeter employing FM principles. This and the RCA pulse altimeter later became standard equipment for the Army, Navy, and the British. A large quantity of altimeters of these types have been manufactured for controlling the height of paratroop planes at the time of jumping, for use in bombing enemy ships, and for other military purposes.

1938-9—RCA Victor manufactured the first radar equipment purchased by the Navy.

1939-40—Twenty high-power sets, based on the Navy's design, were developed and installed by RCA Victor in the Navy's important vessels.

1940—RCA developed and built radar apparatus which was especially suited for use on destroyers, and apparatus designed especially for submarines. These equipments were among the earliest procured by the Navy, and have proved very successful.

1940—Experience in the manufacture of vacuum tubes made it possible for RCA Victor to be the first and only manufacturer in the United States to produce a radar tube developed in England. RCA also produces many other types of radar tubes, including the cathode ray tubes of which RCA is largest manufacturer in the world. RCA's unchallenged leadership in cathode ray tubes for radar was made possible by extensive developments in television, since television, too, requires high quality cathode ray tubes.

1941—RCA Victor supplied receivers and indicators for the type of radar then used by the Army.

1942—Loran, *a system of long-range navigation*, was manufactured by several firms, but difficulties were encountered because of size and weight of the receiver. In 1942 RCA Laboratories undertook the design of a simplified, compact receiver, and achieved such success that large quantities were ordered from RCA Victor and from other firms instructed in RCA's design, and other types were discontinued.

• • •

Some of RCA developments are of major importance in developments of other concerns engaged in radar manufacture.

RCA gave complete design and instruction to other firms in altimeters, tail warning devices, bombing devices, tubes, Loran receivers and other radar equipment designed and developed by RCA.

Several hundred RCA specialists were abroad during the war servicing radar and communication services for Army and Navy equipment made by RCA and other firms.

RCA was represented on the National Defense Research Committee and on other government technical committees on war activities.

RCA engineers have been loaned to government laboratories for special radar projects.

RCA has co-operated with England in radar projects.

Radio Corporation of America

30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

CHEMISTRY

DDT Can Wipe Out Plagues

In total war against disease-carrying insects, it could eliminate typhus, malaria and African sleeping sickness, Swiss chemists declare.

➤ DDT CAN send malaria mosquitoes, typhus lice and other disease-carrying insects to join the dodo and the dinosaur in the limbo of extinct species, thereby ending these particular plagues for all time.

This was the promise held out by the two Swiss chemists who started DDT on its present spectacular career as a killer of insects, Dr. Paul Lauger, technical director of the firm of J. R. Geigy, S.A., and Dr. Paul Muller, inventor of the DDT insecticides, at a press conference in New York.

African sleeping sickness, spread by the tsetse fly, was another scourge mentioned as a possible candidate for extinction. The area in Africa that is now practically an unpopulated waste because of the menace of this terrible disease could be hemmed in by a cordon of DDT-armed insect-fighters, who would press constantly in upon the fly-infested terrain both in the air and over the ground, until the last acre had been mopped up.

Mass attacks of this kind, Drs. Lauger and Muller admitted, would cost money and take time; but the cost in either would be only a fraction of that demanded by war—and human lives would be saved, not recklessly spilled. Such campaigns would also be devastating to beneficial insects and other cold-blooded forms of life, they said, but they claimed these could repopulate the areas by inward dispersal from the unsprayed margins.

On a less sweeping scale, but still on a major field campaign basis, the two Swiss chemists pointed out how DDT can be used to combat some of our worst crop pests, like boll weevil and other cotton insects. These often constitute the bulk of the insect life of the large fields where the crops are grown, so that damage to beneficial insect populations becomes a less serious consideration.

DDT can even be used in warfares against dug-in insect enemies, it has been discovered. It can be used effectively in this way against the grubs or larvae of the Japanese beetle, though oddly enough it has not been found particularly poisonous to their close cousins, the big white grubs that grow up to turn into Junebugs or May beetles. Another ground-dwelling pest that succumbs to DDT is the roundworm or nematode that causes root rot, a disease afflicting many plants.

For some of these mass attacks, DDT has been found a hundred times more effective than the arsenical poisons hitherto in use. For instance, 15 pounds of DDT per acre will be as effective against Japanese beetle larvae as 1500 pounds of a standard arsenic compound applied to the same area, Drs. Lauger and Muller stated.

DDT can be applied by practically any method now in use with other insecticides. It is especially effective dissolved in Freon and released as an aerosol, but it also works well dissolved in kerosene or other light oils and used with ordinary spraying machinery. It is only slightly soluble in water, but oil solutions can be easily made into emulsions. Dispersed in inert powdered materials such as talc or kaolin, DDT is an excellent crop-dusting medium.

One of the most promising carriers for household use of DDT seems to be wall paint. Since flies, mosquitoes and other domestic pests need only to touch it with their feet in order to pick up enough to kill them, a DDT-carrying painted surface turns the whole interior of a room into a big death-trap for them. Several well-known commercial firms are already manufacturing DDT paints.

Such paints are effective only as long as their surface remains clean. Coatings of dirt or grease form protecting layers between the poison and the feet of the insects, causing loss of killing potency. Paints that tend to scale or crumble a little, thereby automatically keeping fresh surfaces exposed, promise to be especially good as DDT carriers.

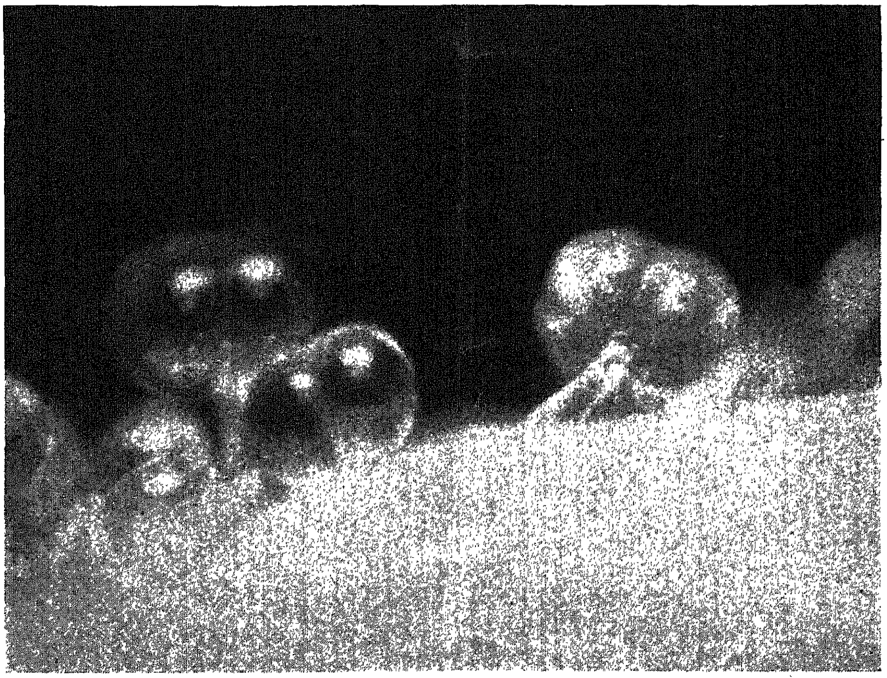
Shelf age, the Swiss scientists declared, holds no terrors for DDT. It stays good indefinitely, either in pure crystal form or in the various solutions.

Science News Letter, September 8, 1945

PLANT PHYSIOLOGY

Leaf Glands on Plant Resist Drought

➤ THE FIRST pair of true leaves appearing on the sesame, an herb bearing seeds from which an oil is obtained, be-



RESIST DROUGHT—Glands on the foliage of a sesame plant, as shown in this greatly magnified picture, look like sets of four little soap bubbles on stems. Plants well-equipped with glands seem to be more resistant to drought than plants with bare leaf surfaces.

tray whether the plant will be able to withstand long droughts or excessive rainfall.

During a period of drought, varieties with many leaf glands showed less wilting than the types with few glands, Dr. D. G. Langham of the Department of Genetics, Instituto Experimental de Agricultura y Zootechnica, Caracas, Venezuela, reports in the *Journal of Heredity*. During a period of excessive rainfall, on the other hand, varieties with few leaf glands were more resistant to "wet feet".

With a little practice it is not necessary to use a lens in determining whether the leaf surface has few or many glands, which look like quadruplet soap bubbles on stems. In connection with experiments to develop varieties of sesame adapted to culture in Venezuela, a large number of varieties were studied. It was found that when plants with many leaf glands are crossed with plants with smooth leaves, the hybrid has the glands and so do three out of four of the plants from it.

Science News Letter, September 8, 1945

AGRICULTURE

Distribution Problem

Is seen as the big puzzle in feeding the world. Fewer farmers may actually produce more food if more man-hours are devoted to handling.

➤ FEEDING a world constantly hovering on the thin edge of hunger was presented as a problem of processing and transportation more than of actual labor on the farm itself, by Paul H. Appleby, formerly Under Secretary of Agriculture, now director of Station KIRO, Seattle, speaking before the Sixth Conference on Science, Philosophy and Religion, in New York.

Citing conclusions reached at the international food conference held at Hot Springs, Va., Mr. Appleby pointed out that among other things they "hint at the anomalous fact that the world can be better fed only by reducing the proportion of the world's productive man-hours going into agriculture, and, conversely, by putting more man-hours into the production of other things—roads and railways, machinery, storage facilities, processing plants, household facilities, power plants, etc."

More food, he stated, is produced per capita in countries where agricultural technology is advanced as contrasted with countries having small hand-tool, subsistence type farmers.

Raising the level of all nations' capacity to support themselves, Mr. Appleby contended, does not demand assumption of a Santa Claus role by the United States or any other one country, but rather improvement in international cooperation through interchange of ideas and information of mutual benefit to all.

"The quickest and most certain improvement in communication will be between scientists," Mr. Appleby declared. "Research is essentially international in its approach and in its implications. Scientists wherever they work have constituted one body, even though somewhat nebulous. And the essential unity of scientists carries over to technology and education. In these fields specialized association may be expected to increase markedly with new stimulation and facilities. The numbers concerned, their proportion to total population, and their direct influence will vary greatly among the different national societies, although all three groups will exist in all societies."

Science News Letter, September 8, 1945

CHEMISTRY

Antianemia Vitamin Factor Isolated in Pure Form

➤ CRYSTALS of a pure chemical which is a form of an antianemia vitamin have been isolated for the first time by scientists at the research laboratories of Parke, Davis and Company in Detroit.

This vitamin chemical is known only by the technical name of vitamin Bc conjugate. Its isolation is announced in *Science* (Aug. 31). Scientists reporting the work are Drs. J. J. Pfiffner, D. G. Calkins, B. L. O'Dell, E. S. Bloom, R. A. Brown, C. J. Campbell, O. D. Bird.

The vitamin is related to another vitamin called folic acid. Synthesis of the latter by scientists at Lederle Laboratories, Pearl River, N. Y., was announced a few weeks ago. This vitamin apparently exists in a number of chemical forms in different substances, such as liver and yeast. As various scientists have discovered one or another of its forms, because of its effects on blood formation in monkeys or chicks or its importance for the growth of certain bacteria, they have given varying names to the substances. Some of these substances may be identical. At least five different ones are believed to exist.

Isolation in pure chemical form of vitamin Bc conjugate and the synthesis of folic acid may lead to further knowledge about all these related vitamin factors and what part any or all of them play in human health and nutrition.

Science News Letter, September 8, 1945

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PHYSICS-ASTRONOMY

Atom Started Universe

Whole universe began as explosion of a single giant atom two billion years ago, is the suggestion of a Belgian scientist. Uranium bearing rocks support theory.

➤ ATOMIC explosions that wipe out whole cities in an instant seem awesome on a human, planetary scale. Seen from a cosmic grandstand, however, they are scarcely even sparks from a single powder-grain in the grand pyrotechnics of the universe.

Indeed, according to one bold theory, the whole visible universe, with great pinwheel galaxies containing millions of flaming stars, and with possible swarms of planets like the earth that have never been seen and only lately have been rather vaguely guessed at, got its start as a single super-atom of unimaginable energy content, that exploded a couple of billions of years ago—and is still exploding. All the energies of which we are aware, from the bursting brilliance of giant stars that far outshine our sun down to the feeblest kicks of a dying protozoon, are but the varied expressions of that vast primal explosion, if this hypothesis holds good.

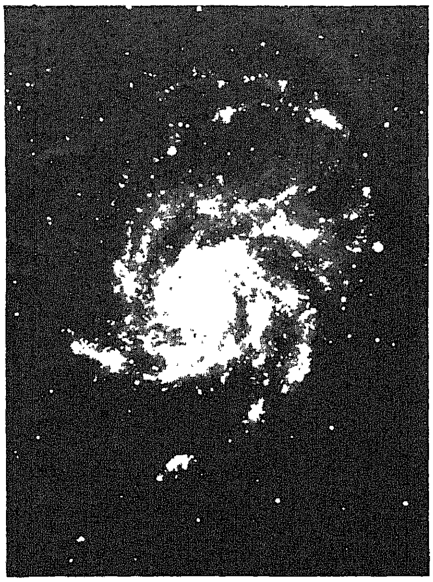
The idea started with the notion of an expanding universe. Light from remote stars and galaxies, caught in astronomers' *instruments, is redder than it theoretically* should be. One explanation of this so-called red shift is that all parts of the visible starry universe are rushing away from each other at terrific speeds—much faster than the pieces of an exploding bomb.

About 15 years ago a young Belgian priest-scientist, the Abbé Georges Lemaitre, boldly suggested a backward extension of this expanding or exploding universe. Mathematical calculations carried him back to a beginning-point where neither time nor space existed, and all the matter that eventually came to constitute all the stars and planets was present only potentially, as terrifically high-level energy in one single cosmic atom.

Chemical elements as we know them are discussed in terms of their atomic weights and atomic numbers, which are expressions of the number of electrons spinning around the sunlike nucleus or atomic heart. Since the number of electrons in the smallest pinpoint of ordinary matter—a single dust-grain, for example—must be reckoned in trillions, the atomic number of this primordial atom is simply unimaginable. We have to call it infinity and let it go at that.

What the first atomic explosion was like is also something that defies human imagination. What set it off is doubtless forever beyond our guessing. Theoretical considerations have led the Abbé Lemaitre to a tentative conclusion that it must have occurred something like two billion years ago. Analysis of uranium-containing rocks from the earth's oldest known geological formations are of about that age, by other, independent methods of analysis and calculation. This would seem to require more time than the Lemaitre hypothesis allows; but it has been suggested that perhaps in the beginning the evolution of cosmic materials went on at a much more rapid rate, and that by the time the processes we know as geology could begin events could be ticked off by a slower clock.

If these dizzying ideas are valid, our most terrifying "city-buster" bombs are made of mere pinches of debris from the universe's first enormous outburst, scraped up out of overlooked corners like a winter's last snowballs.



ATOMIC PARTICLE—According to the Lemaitre hypothesis, the entire universe, of which this galaxy or spiral nebula is a very small part, all started out compressed in a single cosmic atom that 2,000,000,000 years ago started the explosion that is still going on.

Science News Letter, September 8, 1945

NUTRITION

Saccharin Harmless as Ordinarily Used

➤ IS IT safe to use saccharin instead of sugar for sweetening tea, coffee, lemonade and some desserts? Since the sugar shortage is expected to continue, many are probably wondering about this and many may have found it difficult to get any specific information on the subject.

The reason for the vagueness is that apparently only a few studies of saccharin's effect on the body have been made. About 30 years ago the Secretary of Agriculture asked a referee board of consulting scientific experts in the Department of Agriculture to look into the matter. This board reported that in small quantities saccharin was not injurious to normal healthy grown persons so far as could be determined by methods then available for the study. The quantity they stated to be harmless was about three-tenths of a gram per day. This would be about four and one-half grains.

More than this and especially amounts over one gram, or about 15½ grains, taken daily for months might bring on serious digestive disturbances, the board reported.

Saccharin has long been used as a sugar substitute by diabetics and patients with other illnesses. This has usually been on medical advice and probably with the amounts to be used specified by the patient's physician.

Home economists of the Department of Agriculture advise against the use of saccharin as a sugar substitute in cooking and particularly in canning because such use is likely to give the foods a bitter flavor.

In 1937 Dr. W. W. Bauer, director of the bureau of health education of the American Medical Association, answered a question about possible injurious effects of saccharin by stating that it "is quite harmless in the amount ordinarily used."

The substance is a coal-tar product which was discovered accidentally in the course of investigations by two American chemists, Ira Remsen and C. Fahlberg, at the Johns Hopkins University. It is from 300 to 500 times as sweet as sugar.

Science News Letter, September 8, 1945

GEOGRAPHY

China's Assets

She has sufficient natural resources and population to prevent future Japanese encroachments, if necessary national developments are carried out.

➤ CHINA, where the possibilities of civil war now seem abated through agreement between the Chungking government and the communists of the North, has sufficient area, natural resources and population to prevent Japanese aggression in the future if necessary national developments are carried out.

These include a united government under a new constitution giving the common people some say in governmental affairs, greatly expanded and improved educational opportunities in both general and technical education, a wide-spread effective public health program, the establishment of industries to use China's natural resources, and an extensive program in land management and use.

China also needs a navy; the nucleus of which could well be the remnants of the Japanese and German war fleets, which those two nations will not be permitted to retain.

China has, in Asia, a somewhat similar position and similar possibilities to those of the United States in North America. It has, of course, only one seacoast. This is perhaps a handicap, but its area is one-third greater than that of the United States, and it has over three times as many people. Like the United States, it extends from a semi-tropical South to a bleak and cold North, from a rainy coastal area to an arid plateau and mountainous interior, and from interior fertile plains suitable for grain and other foods to mountain slopes adapted for grazing and timber. It has great known mineral deposits that are only partially developed, and undoubtedly many more as yet undiscovered.

Mountains occupy 30% of China's area, high plateaus 34%, hilly regions 9%, basins 16%, and alluvial plains 10%. It has almost every type of known topography. Three large navigable rivers drain the three natural divisions of the country; the Yellow in north China, the Yangtze in central China, and the West, or Pearl river, that empties into the South China sea near Hongkong.

Communication and transportation are two of China's great needs to make it a great nation in world affairs. Telephones were relatively rare in prewar days, in contrast with some 20,000,000 in the United States. Telegraph mileage was also very low and very few families could afford to have radio receiving sets to get the programs from about 50 broadcasting stations. In the United States there were 750 stations and over 40,000,000 receiving sets.

In 1931, China had less than 7,000 miles of railroad. Some additional mileage was built in the next few years, but the Chinese-Japanese war which started over eight years ago prevented putting into operation an extensive railway-building program sponsored by the government. In America at the same time there were 248,000 miles of railroad.

At the beginning of the Japanese war on China, the highways in China totalled some 67,000 miles, less than one-fourth of which were surfaced, the rest being earth roads. The United States has nearly 3,000,000 miles of highways, nearly half of which are classified as improved.

China now produces practically every food and commercial crop that is grown in the United States, and in addition tea, certain medicinal plants, insecticides, and other important products. Rice is the principal food crop raised for home consumption, but normally the wheat crop is half as great. Soybeans, and other beans, are important crops as well as barley, oats, corn, millet, peas, potatoes and sugar. For vegetable oils, sesame, rape, flaxseed and other plants are grown. For fiber, cotton, flax, hemp, ramie, wool and silk are produced.

Although China has much excellent and other usable grazing land, its cattle industry is low in comparison to that of America. Chinese are not heavy meat-eaters, particularly among the common folk, probably for economic reasons. However, China has normally some 20,000,000 head of cattle, millions of sheep, swine and goats, and a large number of buffalo, the latter used principally as beasts of burden. Its meat and dairy industries could be greatly increased.

Coal topped China's mineral production before the war, with limestone and iron ore second and third. In America, China is thought of principally as a source of tungsten, tin, antimony, mercury, manganese, bismuth and molybdenum. It mines, however, considerable gold, silver, zinc, asbestos, sulfur, and arsenic ore. Many other metallic and nonmetallic minerals are also produced. Coal reserves in China are estimated to contain over 240,000,000,000 tons.

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ASTRONOMY

Nova Bursts Forth In Constellation Aquila

➤ A GREAT stellar catastrophe has produced a nova or new star in the constellation of Aquila, the Eagle, now visible high in the southwest. Of the seventh magnitude, the nova is just too faint to be visible with the naked eye.

The nova was discovered by Nils Tamm of the Kvistaberg Private Observatory in Bro, Sweden, who already has to his credit the discovery of two other novae in this same constellation. News of the discovery was rushed by Prof. Bertil Lindblad of the Stockholm Observatory to Prof. Elis Stroemgren of Copenhagen University Observatory, world astronomical information bureau, who cabled Harvard College Observatory, clearing house for astronomical news in the Western hemisphere.

This nova, which until a few days ago appeared as a faint star on photographs, had already passed its maximum brilliance when discovered on Aug. 26. A study of the star's spectrum shows that this new star, which may have flared into a sixth magnitude star, is getting fainter.

About a hundred novae, stars which flash to sudden brilliance and then usually fade to insignificance, have already been discovered in the Milky Way. Several plates made at the Harvard College Observatory confirm the discovery of this bright star, which at present is a great deal hotter than our sun.

When found, the star had a right ascension of 19 hours, 16 minutes, and a declination of plus zero degrees, 35 minutes. Observatories throughout the world are being notified of this gigantic stellar outburst.

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All plants and animals living in the sea that have been analyzed contain *iodine.*

Trees planted next to street lights are likely to hold their leaves longer in autumn and be tardy in budding out in the spring.

GEOGRAPHY

Koreans Pleased

They like the prospect of having their country occupied by American forces, for they look to us for independence. Japs prefer it to Soviet domination.

➤ THE SOUTHERN half of Korea is to be occupied by American forces, it is reported. This will please the Koreans, who look to America for independence and who have forgiven the United States for the small part it played in the 1905 Treaty of Portsmouth (N. H.) which gave Japan a protectorate over Korea and resulted in its complete involuntary absorption into the Nipponese empire five years later.

Perhaps it will please the Japs also, who prefer American occupation of Korea to Soviet occupation. Korea, called Chosen by the Japs, was the principal bone of contention in the Russo-Japanese war that resulted in the treaty. Russia wanted control of Korea as a protection for Port Arthur on the Manchurian coast, which she had leased from China, and for Vladivostok, Siberia, on the Japan sea coast. To Japan, Korea under any control except Japanese was "a dagger pointed at its heart."

The loss of the Korean peninsula to the Nipponese empire is one of the most severe land losses of the war. Korea was its foothold on the mainland of Asia, and the road that led to Manchuria and China. Korea was needed also, the Japanese felt, for its coal and other minerals, for its agricultural resources, and for a place of resettlement of the overflowing Nipponese population. For 40 years Japanese overlords and settlers have exploited the native Koreans, their land and their mineral resources, and thwarted their education, their religion and their social and economic development.

Japan's desire to own Korea is not a late 19th century development. Three centuries earlier she tried to gain a foothold on the Asiatic mainland by the Korean route, and waged a seven-year war against Korea. This ended in 1599 unsuccessfully, largely because of the famous ironclad "turtle" ship, invented and developed by a Korean admiral in 1592. Against it the Japanese navy and transports found themselves helpless.

This oar-propelled ironclad vessel, probably the first in history, was 120 feet long and 30 feet wide, with its sides and top covered with iron plates. It took its name from the general appearances of its top, and from its turtle-headed prow used for ramming purposes. Portholes on all sides permitted the shooting of fire-arrows at an enemy, and also the use of cannon and crude bombs, it is claimed.

Korea, a little larger than Kansas in area and resembling the Florida peninsula in shape, lies between the Sea of Japan and the Yellow sea. Its southern extremity is about 120 miles across the water from southwest Honshu and Kyushu. Its prewar population was approximately 23,000,000. It is a mountainous country with fertile valleys and excellent grazing lands, and has a coastline of some 6,000 miles on which there are many excellent ice-free harbors and near which are some 200 inhabited islands. The Koreans resemble the Japanese in appearance, but there the similarity stops.

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ENEMY SPOTTED!—The three operators seated on the mount of this Radio Set SCR-268 see indications of the airplane echo on cathode ray oscilloscopes. One operator tracks the aircraft in azimuth, another tracks in elevation, and the third measures the range. "Mickey Mouse" is the name given to the type of radar set shown on the front cover of this SCIENCE NEWS LETTER which stood guard against the Luftwaffe near San Pietro, Italy. Official Signal Corps photographs.

CHEMISTRY

Durable, Hard Enamel For Household Equipment

➤ MORE durable and sightly finishes for household refrigerators, stoves and other equipment is promised with new synthetic, exceptionally hard, stainproof enamels developed by the Arco Company and already in production. They will be known as synox finishes.

One type of the new enamel is designed for such articles as refrigerators, stoves, ironers and electric mixers, and another for dishwashers and washing machines. Laboratory and practical tests show that they have an unusual degree of water and alkali resistance, it is claimed, also resistance to stains and change of color.

The new material has been successfully applied to clean steel, with or without primer, and to aluminum and magnesium. Despite its hardness, synox has a flexibility which is more than ample to meet all service conditions.

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CHEMISTRY

Fungus-Proof Fabric Is Promising Development

➤ A MODIFIED cotton cloth, that failed to rot during six months buried under soil where ordinary cotton would rot in a week, has been developed in the Southern Regional Research Laboratory of the U. S. Department of Agriculture. It is a partially acetylated cotton, which is somewhat related to rayon made by the acetate process.

The new material has the strength and appearance of ordinary cotton, but it has the ability to resist the attack of rot-producing microorganisms and to resist mildew. In contrast with many preservative finishes on cotton, the treatment does not produce discoloration. The treated fabric is odorless and is not sticky. It can be used in food sacks because the fabric is not poisonous.

To test the rot resistance of the material some of the treated cloth and thread were buried in the ground and in especially prepared beds teeming with microorganisms of the kind that would have rotted ordinary cotton within a week. After six months they had lost very little strength. Sandbags made of acetylated cloth, sewed with similarly treated thread, and piled outdoors on the ground, were still intact after two years.

This modified cotton should be satisfactory for making clothing that will not mildew, tents and awnings that will not rot in damp climates, and fish nets that can be stored wet. It is also promising for use in making bags for fruits and vegetables.

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CHEMISTRY

Natural and Synthetic Rubbers May Be Combined

➤ WAR experience in the making and field use of tires can be expected to have considerable influence on the design and construction of tires for postwar cars, Dr. Waldo Semon, director of pioneering research for the B. F. Goodrich Company, stated in a radio address.

Confronted with an enemy-caused famine in natural rubber, scientists and manufacturers in the United States cooperated in doing the impossible, and filled the gap largely with synthetic rubber, mass-produced in this country for the first time. The speaker declared that while war-time tires of synthetic rubber may not be fully a match for the best prewar natural-rubber tires, "a synthetic tire that is more than a match for prewar naturals may be 'just around the corner.' "

War-pressured speed-up in research has taught us many things about better tire design as well as improvement in basic materials, Dr. Semon stated, just as the spur of war has caused many very rapid advances in many other fields of applied science.

However, the speaker cautioned, "I would like to refute the rather common assumption that war speeds up technical progress. It's a big subject and could stand a lot of arguing, but I have long regarded as one of the world's most tragic fallacies the notion that war adds to the stockpile of fundamental knowledge. It is true that some spectacular advances in science are brought out under the spur of war, but in the long run war depletes rather than adds to the sum of fundamental knowledge. And for the most part the hard, digging research behind even those spectacular wartime advances was carried on during the years of peace."

Dr. Semon spoke as the guest of Science Service on the CBS program, "Adventures in Science."

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ENGINEERING

Electricity and Gas Used In Under-Water Cutting

➤ A NEW method of under-water cutting of steel plates on sunken vessels, using electricity and gas in combination, has been developed in Moscow by Dr. K. Khrenov, who is responsible for many under-water cutting techniques that have been successfully used in the removal of collapsed bridges and ships from Russian river bottoms. In his method a stream of hydrogen is sent into the cutting electric arc, resulting in a considerable saving of electricity.

Dr. Khrenov suggested using electric-arc welding under water 13 years ago, when he found that the arc is protected by gas bubbles formed. The arc is protected in much the same way that the flame in a lamp is protected from air currents by the glass chimney. Arc welding and cutting under water are common practices throughout the world.

In his experimental work in his laboratory, Dr. Khrenov uses a large steel tank filled with water, with electric lights on its sides and bottom. It is large enough for a man in a diver's suit to work on large plates under the surface.

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IN SCIEN

METEOROLOGY-ELECTRONICS

Radar-Equipped Aircraft For Weather Forecasting

➤ RADAR may serve an important meteorological function, now that the wars are over, in assisting the U. S. Weather Bureau in weather forecasting, a job that it performed satisfactorily during the past months in the Pacific area. The Air Technical Service Command has released information about the radar reconnaissance aircraft that gave home stations prompt and accurate pre-flight weather information in areas where bombing flights were scheduled.

A 450-pound piece of radar equipment, developed at Wright Field and originally used for blind flying, was adjusted to provide the meteorological information as well as navigation data. With his set trained on the air around him instead of on landmarks below, the radar operator, by pushing a switch marked "weather" gets a picture of advance cloud formations on a special detecting screen. Tracking clouds instead of a target, the screen will indicate approaching storms at distances of from 100 to 200 miles.

These weather observation planes reported information back to their bases every half hour, and from the bases it was relayed to bombers and fighters flying near the storm area.

Ground search radars have also been adapted to provide meteorological data, and were also successfully used in the Pacific.

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CHEMISTRY

New Plastic Upholstery Does Not Burn Easily

➤ A FIRE-resistant, plastic-coated upholstery fabric, which is expected to be used in boats, restaurant seats and office furniture has been developed at the du Pont coated fabrics laboratory at Fairfield, Conn.

Created for use in aircraft, tanks and ships, the fabric consists of a flameproofed cotton cloth base with a flexible fire-resistant surface coating of synthetic resin. The pliable material will char in contact with a flame, but will not continue to burn when the flame is withdrawn.

Science News Letter, September 8, 1945

CE FIELDS

GENERAL SCIENCE

Latin American Students Receive U. S. Scholarships

➤ CHEMISTRY or related fields has been chosen by 19 of the 216 Latin American students awarded scholarships for on-the-job training in the United States under the auspices of the Office of Inter-American Affairs. Ten have already completed their studies.

Three of the students now in training are from Brazil, two from Uruguay and one each from Argentina, Chile, Mexico and Paraguay.

They are located as follows: Alberto Lagomarsino, Argentina, pharmaceuticals, Merck & Co., Rahway, N. J., and Vick Chemical Co., New York. Wilson F. Falcao, Brazil, plastics, International General Electric Co., Inc., Pittsfield, Mass. Walter de Oliveira, Brazil, industrial chemistry, United States Corporation, Clewiston, Fla., and U. S. Industrial Chemicals, Inc., New Orleans. Luis Telles, Brazil, chemical products, Lehn and Fink Products Corp., Bloomfield, N. J. Luis Garcia, Chile, plastics, Waterbury Companies, Inc., Waterbury, Conn. Virginio Olmedo, Paraguay, clinical chemistry and bacteriology, Arlington County Hospital, Arlington, Va. Enrique Orvananos, Mexico, industrial chemistry, Reynolds Metals Company, Richmond, Va. Agustin Etcheverry, Uruguay, dyestuffs, E. I. Dupont de Nemours & Co., Inc., Wilmington, Del.; and Hugo Garrido, Uruguay, industrial chemistry, Paragon Packing Company, Astoria, Oreg.

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PSYCHOLOGY

Idiot Has Unusual Power to Visualize

➤ HOW a 29-year-old "idiot," whom tests indicate has a mental age of a year and a half, is able to do the surprising feat of naming the day of the week on which any date fell within the last 30 years was investigated by A. Dudley Roberts of Lapeer State Home and Training School, Lapeer, Mich.

It is not because of any extraordinary mathematical ability, but because of his unusual talent for visualizing something that he has once looked at for a long *of Genetic Psychology*. He is apparently able to "see" every page of the calendar no matter how many months since the leaf was torn off.

Although spastic paralysis makes him unable to do many things that babies of a year and a half can do, which may account for his low "mental age," his mind in many ways has developed to a level found among children from six to nine years of age. Unable to walk or talk, he answered questions by nodding or shaking his head. His vocabulary, ability to remember numbers and to handle simple arithmetic problems was found equal to that of children in the first or second grade.

The patient is reluctant to give away the secret of his special ability, but a clue was obtained from the fact that he not only could tell that Nov. 27, 1930, was on a Thursday, but that it was printed in red on the calendar.

To test the theory this suggested, a calendar was prepared for 1945, with which year he was not already familiar, using three colors, the various colors being given to the dates at random. Two days later, after correctly giving the week-day, he seemed startled when asked the color of the number. Yet in practically all 12 dates chosen, he not only gave the day of the week, but told whether it was printed in red, blue or black.

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PHYSICS

Dreams About Atomic Power Are Due for Revision

➤ DREAMS of the romanticists that atomic power has abolished work and responsibility are due for drastic revision.

In dealing with atomic forces, we are not playing with tame power plants of toy dimensions. The atomic reaction will not begin until amounts of matter measured in pounds and tons are brought together.

Once brought together, these fantastically dangerous materials are watched by automatic mechanical guardians and controlled by scientists at distant stations.

Momentary warnings give the signal for split-second adjustments, within ranges measured in centimeters, which mark the difference between orderly power production and such utter annihilation as is caused by the bomb itself.

A plant like this is nothing to carry around in your watch case.

METALLURGY

Super-Cutting Metal Alloy Used No Tungsten

➤ A SUPER-cutting metallic alloy which contains no tungsten was developed in German for war purposes, it is now revealed. The new cutting material consists essentially of vanadium and titanium carbides bonded with metallic nickel.

Information relative to the new material is given in an article prepared by Prof. Gregory Comstock of the Stevens Institute of Technology. It is released for publication by the War Production Board and will soon appear in several technical journals. Prof. Comstock, who is director of the Institute's powder metallurgy laboratory, went to Germany before V-E day, and followed the Army in its advances into the Reich. His job was an investigator for the government-sponsored Technical and Industrial Intelligence Committee to study German scientific and technological developments during the war.

Prof. Comstock was able to secure data covering the amount of the new alloy made in Germany and Austria. One of its principal values to the Germans was that it freed their limited supply of tungsten for other uses. No tungsten is produced in Germany, and Hitler's war machine depended for this essential metal in modern steels upon importations, principally from Spain and Portugal.

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NUTRITION

Earthworms Contain High Quality Protein

➤ IF WE hear, presently, of Mr. Watahiro going out into his Honshu garden to eat worms, it won't be entirely because nobody loves him. More likely it'll be because he's hungry.

Prof. Sidney S. Negus of the Medical College of Virginia, calls attention to two almost-overlooked bits of research on the possibility of common earthworms supplying protein in a pinch. First, two Japanese scientists called attention to the high quality of the proteins found in these squirming little animals. Then a pair of English chemists killed some worms, split them, washed out the dirt, dried the remains to original moisture content, and analyzed them. They found that 12% of the earthworm body is "meat."

METEOROLOGY-PHYSIOLOGY

Maps for Human Comfort

Clothing almanacs will show requirements for all the world. Travelers will know whether to take summer cottons or fur coats.

By MARTHA G. MORROW

➤ CLOTHING almanacs may help peacetime travelers decide whether to take summer cottons and thin underwear, a fur coat and lots of red flannels, a raincoat and overshoes, when voyaging to far-away lands.

Such an almanac, prepared by the Office of the Quartermaster General, shows at a glance the standard items of combat clothing needed month by month to protect the soldier from his environment. Listing both what is optional and what is absolutely necessary, clothing maps for all parts of the world have been prepared on the basis of the climate of these regions.

Maps in the past have been designed to show the elevation of a region, its rainfall, the distribution of agricultural products such as wheat or cotton, the regions where sheep or cattle are raised, and many other specific things. Not until this war, however, have maps been designed to be analyzed from the point of view of human comfort.

The average temperature for each month is shown for all parts of the world on these maps so that anyone can tell at a glance about how hot the region will be during June or October, and whether it is likely to be dry, humid or wet.

Vacation Zones

The climate zone which might be considered to include good regions to spend a vacation—this will particularly interest those of you who didn't get away this summer—are those where the temperature as a rule ranges from 50 to 68 degrees Fahrenheit. In January, this vacation climate in the United States lies around Florida and southern California. In May this zone has moved northward and spread over most of the United States. In August, when most of us are unpleasantly hot, it has gone into Maine and Canada. By October most of the country is again within this zone of ideal climate, which moves back to Florida by December.

The weather of much of coastal southern California is unique for the United States. Here are probably the only places in the country where the temperature throughout the whole year averages from 50 to 68 degrees. In only a few other places in the world, such as in tropical mountains like Mexico City or in northern New Zealand, is there a similar range of temperature variation.

Various colors and shades are used on these maps for each drop of 18 degrees Fahrenheit, ranging from regions where it is extremely hot to those where it is ultra cold. Dry-looking colors such as tan, yellow and gray are used on these colorful maps to mark regions where there is little precipitation. Humid regions such as those in which most of us prefer to live are shown by softer, greener colors. These same shades are dotted to indicate really wet regions, where more rain falls than can easily be evaporated into the surrounding air.

The warmer the air, the more moisture it will evaporate. Thus in making the maps, not only the average rainfall for that month, but also the temperature must be considered. If the average temperature is 86 degrees or over, the region is classed as humid when about 2.6 to 8.9 inches of rain falls a month. But when this same amount of rain falls in a region where the temperature stays around 14 to 32 degrees, the section is classed as wet.

Some maps show all on one sheet the climate for a particular place for each of the 12 months. A circle is divided into 12 segments to represent the months, while colors show the likely temperature and moisture for each month.

Northeastern continental Asia has a greater range in temperature than any other section of the world. During the warmest month the temperature averages as high as 86 degrees. In the coldest winter month the temperature averages 60 degrees below zero, sometimes going as low as 90 degrees below.

TEMPERATURE VARIATIONS—This map, being worked on at the Office of the Quartermaster General and photographed by Fremont Davis, Science Service staff photographer, shows the temperature variation of all parts of the world.

CLIMATE CHART—Maps have been designed to show the climate of important cities month by month. Circles, divided into 12 segments to represent the months, are colored to show the likely temperature and moisture during each month.

Japan, which extends almost as far north and south as the United States, has a variety of climates. The northern island of Hokkaido has about the same weather as Newfoundland. Honshu and the islands farther south enjoy a temperature similar to that of Washington, D. C., but the rainfall is higher in Japan. Except for having to be prepared for more frequent rains, pretty much the same clothing would be needed month by month in Tokyo as in Washington.

The climate of Europe on the whole is mild and equable. In winter western Europe ranges from 32 to 50 degrees Fahrenheit, and from 50 to 68 in summer. Whereas in the United States people wishing to go to a colder climate would travel northward into Canada, in Europe they would not go toward the north but east, moving from England into Germany and Russia. Edinburgh is usually about as warm in January as the Riviera.

France and western Germany have about the same temperature as northern California, Oregon and Washington. Temperate coasts on the eastern side of continents, as represented by Savannah, Ga., or Shanghai, generally experience more severe temperatures than west temperate coasts.

Climate maps make it possible to look at any place for a particular month and compare that climate with the kind of climate with which you are already familiar, probably found right here in the United States.

The two worst climates in which to live are the hot humid and wet cold. This is because of the problem of moisture evaporation. In order to remain comfortable you must lose as much heat as you produce. Evaporation, which is your principal avenue of heat lost during hot weather, is reduced to a minimum in a hot, humid climate such as one finds in the jungle. In a wet cold climate, such as one finds in the Aleutians, too much body heat is used up in evaporating the moisture from your wet clothing, leaving you cold and clammy. When it gets really cold, however, moisture is "frozen out" of the air.

The easiest climate to live in, irrespective of whether it is dry, humid or wet, is that where the temperature averages between 50 and 68 degrees. This is the average temperature at which we try to keep our houses and that to which we most easily adjust ourselves. We may prefer our houses warmer in the day, but we want them cooler at night. The average temperature of day and night is a good index of the degree of comfort in a house or in a climate zone.

Weather is the atmospheric condition which you experience at any one time. Weather averaged over a long time is climate. Thus the amount of clothing

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REINHOLD
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Do You Know?

Liquid *oxygen* is attracted by a magnet.

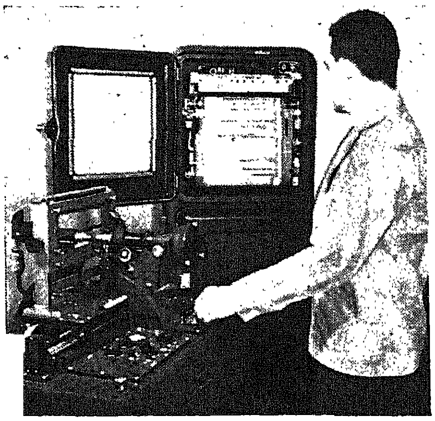
Much long-fibered *asbestos* comes from Rhodesia.

Garden *mulches* do not add to the soil but they do hold for crop use the moisture already there or added later by rain.

The *oyster* is equalled or excelled only by liver in the amounts of iron and copper that it furnishes in an average serving at a meal.

Chemical treatment of *dirt roads* with a small quantity of resinous material makes the earth water-repellent and keeps the road dry.

The familiar moth repellent, *naphthalene,* when oxidized and combined with methyl alcohol forms dimethyl phthalate, a valuable insect repellent odorless to humans but obnoxious to mosquitoes and other pests.



Microphotometer Speeds Metallurgical Analyses

Routine analysis in a lab which receives aily about 500 samples of non-ferrous alloys, as been greatly speeded up by the use of pectrographic methods, with a Knorr-Albers icrophotometer to measure and record the ine densities of spectrograms prepared with ther equipment. The user finds that the speed nd economy of the Microphotometer method couldn't be approached by wet chemical nethods" and that accuracy is equal to or etter than the best chemical analysis. For de- ails of the Microphotometer, see Cat. E-90(1).

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needed for our soldiers or which we will want when Americans can once again satisfy their love of travel is based on the average temperature or climate of a region.

The amount of dry clothing you need depends on the amount of heat you are producing and the temperature of the air at which the heat is lost. Thus the air temperature can be used in determining the clothing which a soldier should have for walking or doing some light exercise. The amount of clothing needed is determined by its thickness—it is bulk and not weight that keeps you warm. If the clothing is dry, its value can be measured by its thickness.

A layer of clothing a quarter-inch thick, or about the thickness of a man's suit, has been taken as the basic standard layer of clothing in working out the clothing almanac. This is the amount of clothing you would probably need when the temperature is around 68 degrees Fahrenheit, if not exercising. For each cooler climate zone you need one extra layer of equal thickness.

The climate zone classification has been used for other types of maps than those showing clothing needs. One example is the mapping of insect-borne diseases according to climate. Malaria breeds at temperatures above 59 degrees Fahrenheit, which is mid-temperature of the mild climate zone. Outbreaks of malaria have been known to occur in Siberia, but only when the average temperature reaches the critical point of 59 degrees.

The amount of fuel needed to keep warm in New York is about the same as in London, though winters in the British capital are much warmer, it is shown in fuel requirement maps made by the climatology section of the quartermaster corps. Areas which have cool summer, spring and autumn weather, such as England, may require more fuel than those having cold winters but warm spring and fall seasons.

During the fall months, a man shipwrecked without drinking water may expect to survive at sea three or four days longer toward the north than near the equator where he can count on living only six or seven days. This is brought out in maps showing water requirements and survival times without water for oceans and deserts. These maps have been used to chart the need of rescue equipment.

In some sections of Arabia and India, a man can survive only one day in the desert without water. Here in the United States in the deserts of California and Arizona, he can probably live at least two days without liquid. Maps showing the expected time of survival at sea and in deserts for men without water were based largely on the precipitation of the region, and on field tests to determine water requirements.

These are just a few of the special maps based upon those showing the climate of various sections of the world. The maps were the idea of Maj. Paul A. Siple of the Climatology section of the office of the Quartermaster General, of Dr. Samuel Van Valkenburg, now with Clark University and expert consultant for the section, and of Maj. Weldon Heald, noted mountaineer and also climatology consultant.

Science News Letter, September 8, 1945

INVENTION

Solar Water Still for Desert Dwellers

➤ PERSONS whose jobs require them to live in desert regions where the only available water is alkali or salt are offered a way to distill fresh water out of it with no fuel other than sunlight, in the invention on which patent 2,383,234 has been granted to W. S. Barnes of Tucson, Ariz.

The unpotable water is held in a long tank, preferably oriented with its long axis on an east-west line. This is covered with a gabled glass roof, or a sawtooth series of such roofs, with a sprinkler-pipe running along the ridgepole. Daytime heat evaporates part of the water, and cooling sprays over the outside of the glass condense the vapor on the inside, where it trickles down into appropriately placed troughs and pipelines. Incidentally, the glass roof is hopefully provided with gutters and spouts, to catch such occasional rains as do fall in almost all deserts.

Science News Letter, September 8, 1945

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ENTOMOLOGY

NATURE RAMBLINGS

by Frank Thone

DDT: After-Effects

➤ DDT, the new insecticide, available for civilian use now, is likely to prove discouraging not only to the insects themselves but to certain industries and businesses that produce and distribute insect-killing appliances used up to now.

It won't bother the insecticidal spray and dust manufacturers much. They'll simply modify their formulas to include DDT, but continue to include some of the old standby materials like pyrethrum, which is quicker-acting than DDT, even if not so certain a killer. Neither will window-screens pass out of use: better tactics, entomologists suggest, will be to put up screens as usual, then spray them with DDT, which will make death-traps of them for weeks or months.

There won't be so much business for the old reliable fly-swatter. For one thing, there won't be so many flies to swat. Besides, what will be the use of following a fly about the house to swat it, when you know that it only has to alight once on the DDT-sprayed wall or ceiling to pick up sure doom on its feet?

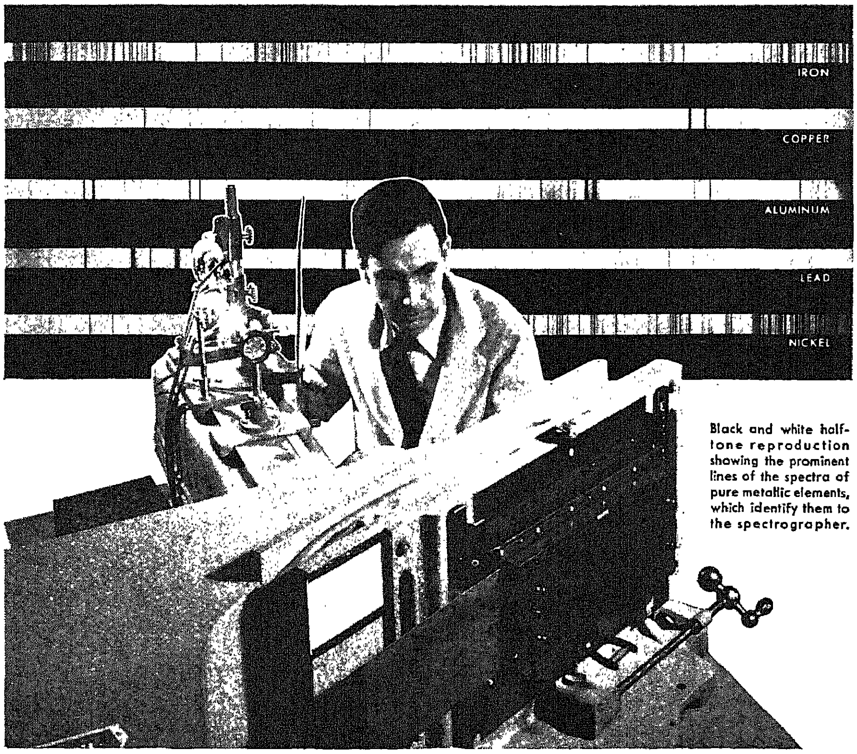
Sticky fly paper, however, faces a dubious future. The gluey sheets on window-sills and table, and spirals dangling from the ceiling, have never been nice to look at, anyway—not to mention the chances of the cat sitting on one of the sticky sheets, or a tall girl getting one of the spirals stuck in her hair. Even less likely to survive are the various types of fly poison, to which flies had to be lured with Borgia banquets of sugar-water or the like. Henceforth flies won't need to seek death in a saucer—it will be waiting for them in any spot where they stop to rest their wings.

Another industry founded on fly-killing, newer than these, that may be adversely affected by the general distribution of DDT is the manufacture of electrically-charged flytraps. Up to now, they have been just about the deadliest contrivances a fly could approach, for the slightest contact of feet or wings with their highly-charged grids is signalled by a miniature lightning-flash marking the end of one fly. They still have the considerable advantage of greater neatness, for the dead insects drop into a tray underneath, and are thus automatically collected as well as killed. Nevertheless, because DDT spraying will be so cheap, and can make such large areas deadly to flies at little expense, its competition is certain to be acutely felt here as well as in the older fly-killing fields.

Science News Letter, September 8, 1945

Egg shells are porous enough to allow fresh air to enter and used air to exit.

Thymol is one of the ingredients in a formula for a mold-preventive for book-bindings; included also are mercuric chloride, ether and benzene.



Black and white half-tone reproduction showing the prominent lines of the spectra of pure metallic elements, which identify them to the spectrographer.

How to Find Gold . . . At the Rainbow's End

This is the instrument that proved the old tale about the pot of gold at the end of the rainbow. This is a modern Bausch & Lomb Spectrograph. To probe the secret of the universe it makes use of the same principles of light that cause the rainbow.

A piece of metal or a chemical compound, smaller than a pinhead, when burned in the arc produces in the spectrograph a rainbow-like spectrum in which the identifying lines of the elements stand out unmistakably. From a photographic record, the spectrographer can identify elements, of which the sample is composed even though the amount may be as small as one part in 100,000,000. Much of today's research in metals, foods, and chemical compounds depends on this optical instrument. Bausch & Lomb Optical Co., Rochester 2, N. Y.

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CHEMISTRY

Hemp Needs New Uses

War-born American industry is looking for industries, other than cordage, to use its products. Rug warp, fire hose, canvas, toweling, tropical clothing suggested.

➤ AMERICA'S war-born hemp industry will require new uses for its products if some 42 processing mills built by the government are to continue in operation. These plants were constructed, and domestic hemp-growing encouraged, to meet a shortage of rope and cordage due to the Japanese control of Manila hemp from the Philippines and elsewhere in the Far East.

"Clothing and textiles from hemp offer one means of nourishing a 'war baby' into a young industry important in national defense," declares *Industrial and Engineering Chemistry*. It states also that government retention of these hemp processing plants and expansion of the domestic hemp industry are being urged by some in the interest of national preparedness.

"To utilize these plants at anything near capacity, new industries for hemp, other than cordage, will be needed," the publication says. "Commercial development of hemp for clothing and textiles in this country has attractive possibilities, since hemp is both the longest and the most highly absorbent natural fiber known."

Among other uses for hemp suggested are use in rug warp, fire hose, canvas, toweling, tropical clothing, by-product paper, and home insulation.

Since the Far Eastern supply of cordage was cut off by the war, American farmers, in Iowa, Illinois, Indiana, Wisconsin and Minnesota particularly, were urged to increase their acreage of hemp. They did so, jumping a prewar average of 14,000 acres up to 165,000 acres. With the liberation of the Philippines the mills are being closed.

Hemp is a tall plant, related to the mulberry tree. It produces the strongest known vegetable fiber. It was used in both World Wars to supplement stocks of the hard fibers, jute, sisal, and Manila.

Although hemp is the strongest fiber known, its qualities as a soft spinning thread make it more suitable for textile, rug, and specialty uses, the article states, than for rope and cordage where the cheaper hard materials are predominant.

Science News Letter, September 8, 1945

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CHEMISTRY

Wax Emulsion Makes Clothing Water-Resistant

➤ EVERYBODY will be able to have water-resistant clothing, as soon as a new war-born emulsion, used in large quantities in the armed services, becomes available in civilian markets. Expert treatment of the clothing will be unnecessary; the emulsion is applied simply by adding it to the rinse water in the family wash.

The emulsion can be applied to many types of fabrics as well as to clothing, such as awnings, tenting, window shades and drapes. It makes the material not only water-resistant but less liable to wrinkle and to spot. Pressed garments will keep their shape longer.

This milky-looking wax emulsion, a petroleum product of the Socony-Vacuum Company, is non-toxic and non-inflammable. It is made up of tiny particles of paraffin wax suspended in a solution of an aluminum salt and water. It is superior to former wax emulsions in which soap is used to emulsify the wax, it is claimed, because such solutions deposit both a soap film and the wax on the cloth.

In laundering, the wax emulsion can be used in conjunction with starch, and it can be used also with mothproofing and mildew-proofing processes if desired. However used, the wax is invisible on the clothing, does not make the material stiff, and does not fill the spaces between fibers. Clothing that has been treated retains its porous qualities, and summer clothing, therefore, remains ventilated and cool.

Science News Letter, September 8, 1945

WILDLIFE

Restrictions on Shooting Pigeons as Source of Meat

➤ GETTING free meat by shooting pigeons of the ownerless flocks that infest most cities, an idea that has suggested itself to more than one red-point-lacking citizen lately, is not as simple as it seems at first thought, the U. S. Fish and Wildlife Service warns. In most municipalities there are rather sharp restrictions on the use of firearms within

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city limits. However, police permission can often be obtained on the plea that the birds are a pest.

Ordinary 12- and 16-gage shotguns are too heavy weapons for killing pigeons, especially at short range. The Fish and Wildlife Service recommends the .410-caliber shotgun, or even a .22-caliber rifle with shot cartridges. A high-powered air rifle can also be used effectively.

Trapping is practicable in some sites and where it can be carried on is preferable to shooting. It at least has the advantage of enabling one to release, unharmed, stray carrier or fancy pigeons that have wandered into dubious society and been adopted as flock-mates by their "hobohemian" companions. Initialed and numbered leg bands usually identify these valued strays.

Getting rid of pigeons as pests, with no idea of using them for food, can also be done by using poison; but this carries with it the risk of having the dead birds picked up and eaten by somebody's pet cat or dog, which will be poisoned in its turn. Poison gas has been suggested, but is not practicable except in the hands of professionals. It is too risky to be attempted by amateurs.

Pigeons can be excluded from belfries, church steeples and other favored nesting sites by nailing chicken-wire inside all openings. If the one-inch mesh is used, it will keep out starlings as well as pigeons.

Science News Letter, September 8, 1945

BIOCHEMISTRY

Mold from Human Hair Stops Typhoid Germs

➤ A "RED-HEADED" mold from human hair may yield a penicillin-like remedy for typhoid fever and some kinds of dysentery. Discovery that a red dye or pigment produced by the mold stops the growth of typhoid and dysentery germs in culture plates, as penicillin stops the growth of other germs, is announced by Dr. L. Rosenthal, of Israel Zion Hospital, Brooklyn, N. Y. (*Science*, Aug. 17)

Penicillin does not have any effect on the typhoid-dysentery group of germs.

The red mold pigment, if it proves effective as a remedy, could be given by mouth, Dr. Rosenthal's studies indicate.

Tests to determine whether it is poisonous or can be safely used and whether it would affect the germs in the body as well as in culture plates in the laboratory are now under way.

Science News Letter, September 8, 1945

• Books of the Week •

THE CONSTITUTION AND TOXIC EFFECT OF BOTANICALS AND NEW SYNTHETIC INSECTICIDES—P. Lauger, H. Martin and P. Muller—*Geigy Co.*, 43 p., paper, illus., free. Trans. of a paper read before the Basler Chemische Naturforschende und Medizinische Gesellschaft.

DIETOTHERAPY: Clinical Application of Modern Nutrition—Michael G. Wohl, ed. —*Saunders*, 1029 p., illus., $10. Foreword by Russell M. Wilder.

EDUCATORS GUIDE TO FREE FILMS—Mary Foley Horkheimer and John W. Diffor, comps.—*Educators Process Service*, 254 p., paper, $4. 5th ed., revised and enlarged.

ESSENTIAL VOCATIONAL MATHEMATICS—Claude H. Ewing and Walter W. Hart—*Heath*, 266 p., illus., $1.60. A first year course for vocational and technical high school students.

EXPERIMENTAL STRESS ANALYSIS. Proceedings of the Society for Experimental Stress Analysis, Vol. 2, No. 2—C. Lipson and W. M. Murray, eds.—*Addison-Wesley*, 166 p., illus., $5. Containing papers presented before the society's fall meeting and symposium on crankshaft stresses.

GOVERNMENT IN PUBLIC HEALTH—Harry S. Mustard—*Commonwealth Fund*, 219 p., $1.50. A study of the New York Academy of Medicine, Committee on Medicine and the Changing Order.

MUSIC AND SOUND SYSTEMS IN INDUSTRY—Barbara Elna Benson—*McGraw*, 124 p., illus., $1.50. Industrial Organization and Management Series. The organization of an industrial broadcasting system.

PIPING HANDBOOK—Sabin Crocker—*McGraw*, 1736 p., illus., $7. Fourth ed., revised and enlarged. For the engineer interested in piping design.

POLITICAL PARTIES: An American Way—*Public Affairs Committee*, 32 p., paper, illus., 10 cents. In cooperation with the National Foundation for Education in American Citizenship. Basic American Concept Series.

PREVENTIVE MEDICINE—Mark F. Boyd—*Saunders*, 591 p., illus. $5.50. 7th ed., revised and enlarged.

SOCIOLOGY APPLIED TO NURSING—Emory S. Bogardus and Alice B. Brethorst—*Saunders*, 312 p., illus., $2.50. 2nd ed., revised and enlarged.

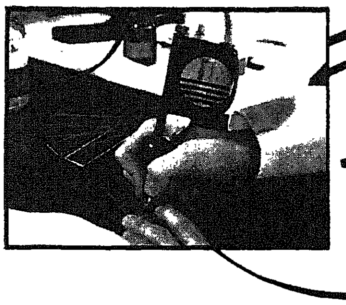
TEXTBOOK OF BACTERIOLOGY—Edwin O. Jordan and William Burrows—*Saunders*, 909 p., illus., $7. 14th ed., revised and enlarged.

WHERE DO PEOPLE TAKE THEIR TROUBLES?—Lee R. Steiner—*Houghton*, 263 p., $3.

Science News Letter, September 8, 1945

Cod fish was once the mainstay of the vitamin industry of the United States, but now cod contributes only about 1% of the output of vitamin A by American manufacturers.

A 10% reduction in losses of adult *hens* by disease would increase the total production of the nation's flocks by half a billion dozen eggs.



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Science News Letter, September 8, 1945

⚙ *MOTORIZED hand truck of the tiltable type is a three-wheeled vehicle with the axle of the single wheel used as a fulcrum to tilt the platform for loading. By a sliding device on the frame where it is attached to the axle, the fulcrum point may be varied to balance the load.*

Science News Letter, September 8, 1945

⚙ *SHRIMP fishing vessel on the Gulf of Mexico, the first of its kind, has on board complete equipment for the immediate processing and freezing of shrimp, and for refrigerating them. By this method a fresher and tastier product is furnished for the table.*

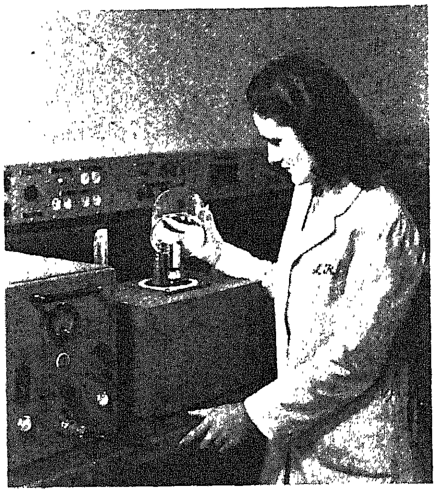
Science News Letter, September 8, 1945

⚙ *GUIDE for a blind man is a light plow-handle-shaped cane, which he pushes along ahead of him. It rolls on a freely swivelled caster on the lower end. A horizontal wheel, mounted just above the caster, will roll along a vertical wall.*

Science News Letter, September 8, 1945

⚙ *PEACETIME coffee percolator is expected to rest on an electrically heated base in which the heat is automatically turned down after the coffee is made. In appearance it will resemble the common percolator with two glass bowls.*

Science News Letter, September 8, 1945



⚙ *ELECTRONIC DRIER, laboratory model, employs a 100-watt radio-frequency generator to provide heat for drying out liquids placed in a moderate vacuum under the small dome shown in the picture. It is designed for research men working with biological solutions and heat-sensitive chemicals.*

Science News Letter, September 8, 1945

⚙ *STORAGE battery, utilizing the principle of the diving bell, and capable of operating while submerged in several feet of salt water, has been developed for motor vehicles in the Pacific war area. Seawater can enter a compression dome of proper size which houses a breather stand-pipe.*

Science News Letter, September 8, 1945

⚙ *WORLD GLOBES, in easily separated halves, are made of a transparent plastic with outlines of geographical features on the face. Removable films, spherical in shape and carrying various types of information, are furnished to insert within the globes and read through the transparent material.*

Science News Letter, September 8, 1945

⚙ *REVOLVING shelves for refrigerators rotate by means of a central vertical shaft so that any article of food on them can be easily reached. The circular shelves are in sections so that any part can be removed for cleaning.*

Science News Letter, September 8, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 275.*

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Question Box

AGRICULTURE

What is seen as the major problem in feeding the world? p. 148.

ASTRONOMY

Where has a nova been discovered? p. 150.

CHEMISTRY

How has cotton cloth been made rot-proof? p. 152.

How much can we expect of DDT in battling plagues? p. 147.

What mold is found to stop typhoid germs? p. 159.

What vitamin factor has been isolated in pure form for the first time? p. 148.

Why are new uses being sought for hemp? p. 158.

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What must China do if she is to prevent future Japanese aggression? p. 150.

Why are the Koreans pleased over the prospect of American occupation? p. 151.

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What further peacetime use of radar is suggested? p. 152.

NUTRITION

What are the rules for using saccharin as a sugar-saver? p. 149.

What food element do earthworms contain? p. 153.

PHYSICS-ASTRONOMY

How long ago may the first atomic explosion have taken place? p. 149.

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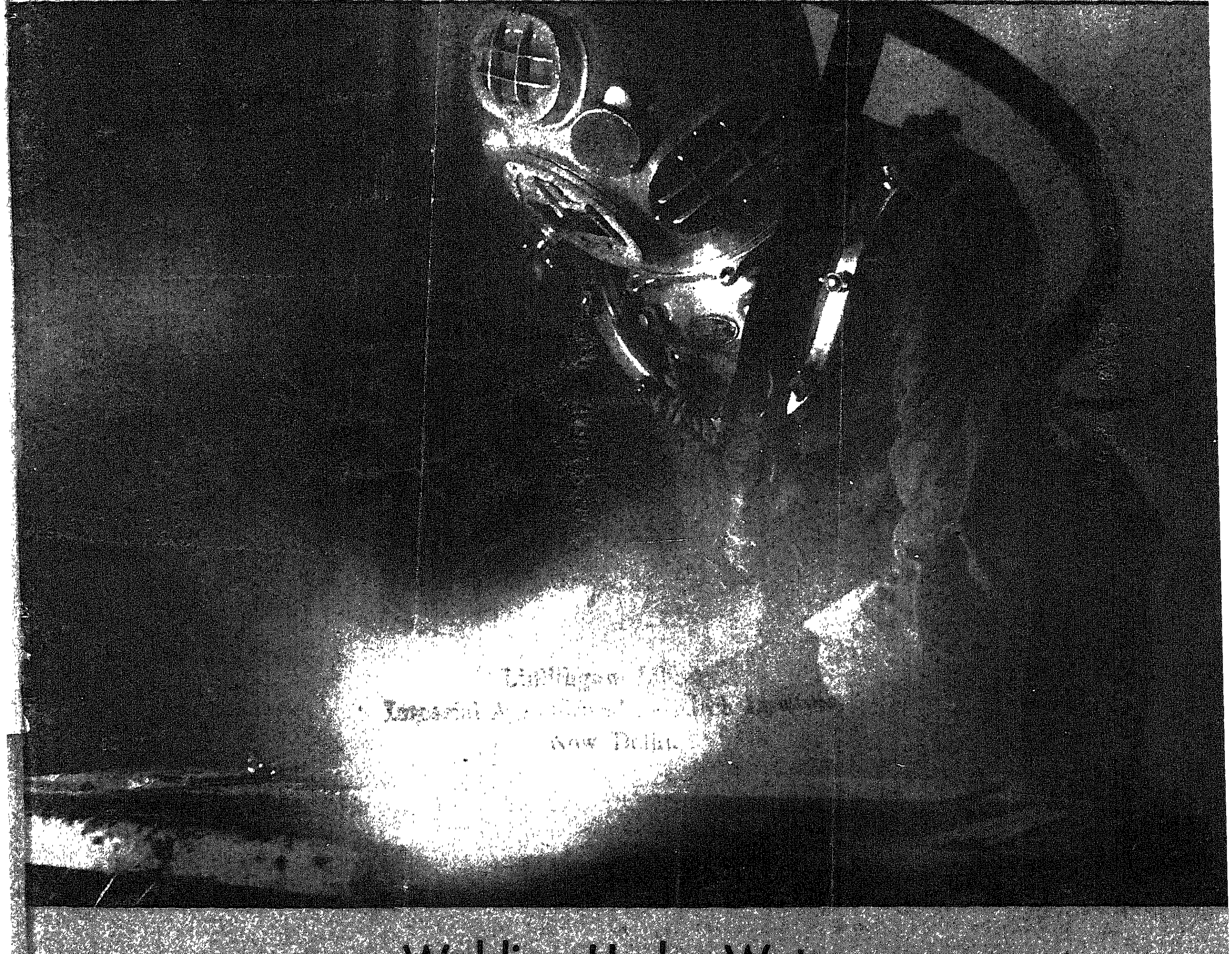
THE WEEKLY SUMMARY OF CURRENT SCIENCE • SEPTEMBER 15, 1945



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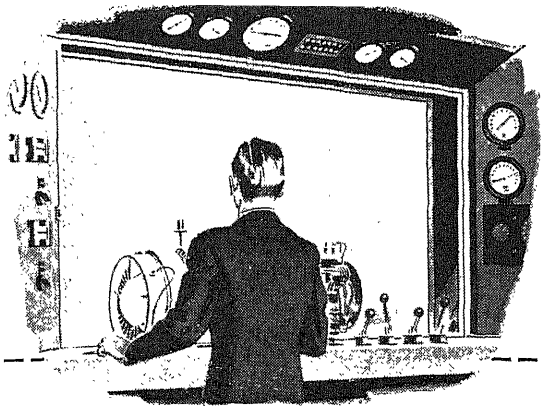
Welding Under Water

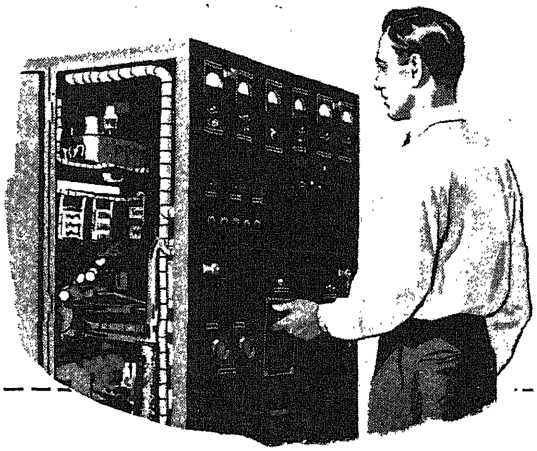
See Page 167

A SCIENCE SERVICE PUBLICATION

In a test cell an ENGINEER studies the performance of a jet-propulsion engine that is expected to produce greater thrust—*for its weight*—than any made in America.

... the name on the J-P ENGINE is Westinghouse.



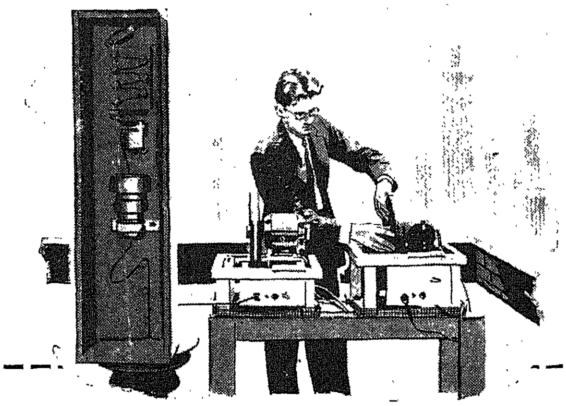


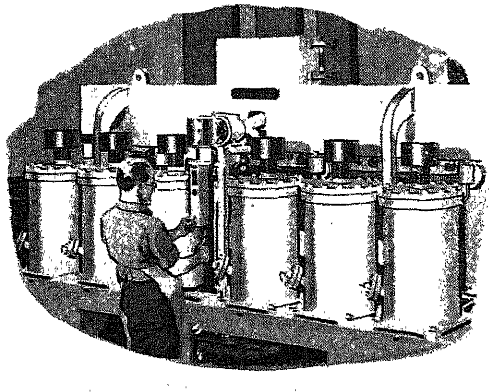
In a synthetic rubber plant a CHEMIST uses a mass spectrometer to analyze a complex gas mixture by sorting its molecules—reducing analyzing time from *days* to a matter of *minutes.*

... the name on the MASS SPECTROMETER is Westinghouse.

High in the air a SCIENTIST adjusts a fulchronograph which accurately records the *intensity* and *duration* of thunderbolts—in the never ending study of improved protection against lightning.

... the name on the FULCHRONOGRAPH is Westinghouse.





In a refining plant a METALLURGIST uses an Ignitron* rectifier for the more efficient conversion of alternating to direct current—in producing vast quantities of aluminum for our war effort.

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Tune in: JOHN CHARLES THOMAS—Sunday 2:30 pm, EWT, NBC • TED MALONE—Monday through Friday, 11:45 am, EWT, Blue Network

ELECTRONICS

Microwave Radar

Largely a wartime development, it is responsible for equipment that licked Hitler and the Japs. Is of much higher frequency than that of prewar days.

➤ MICROWAVE radar, that is, radar working on much higher frequency than used in prewar days, is responsible for most of the radar equipment that finally brought the Germans and the Japs to their knees. The possibility of the use of high frequency radar was one of the earliest problems tackled by Radiation Laboratory, at the Massachusetts Institute of Technology, after its establishment in November 1940. Most of the radar used by the armed forces had its origin in this laboratory.

Radiation Laboratory is a child of the National Defense Research Committee, whose head, Dr. Vannevar Bush, set up in 1940 a special section to develop enemy detection devices of all sorts and appointed President Karl T. Compton of MIT as the head of the section. Dr. Compton allotted space for the section scientists at the Institute.

At that time, radar was well known to all the major nations and was in active war use. But it was longer-wave radar. Dr. Compton therefore appointed a committee to explore the possibilities of microwave, or very short wave, radar. Later, when developments had matured, a total of approximately 3,800 scientists and others worked on radar at this laboratory.

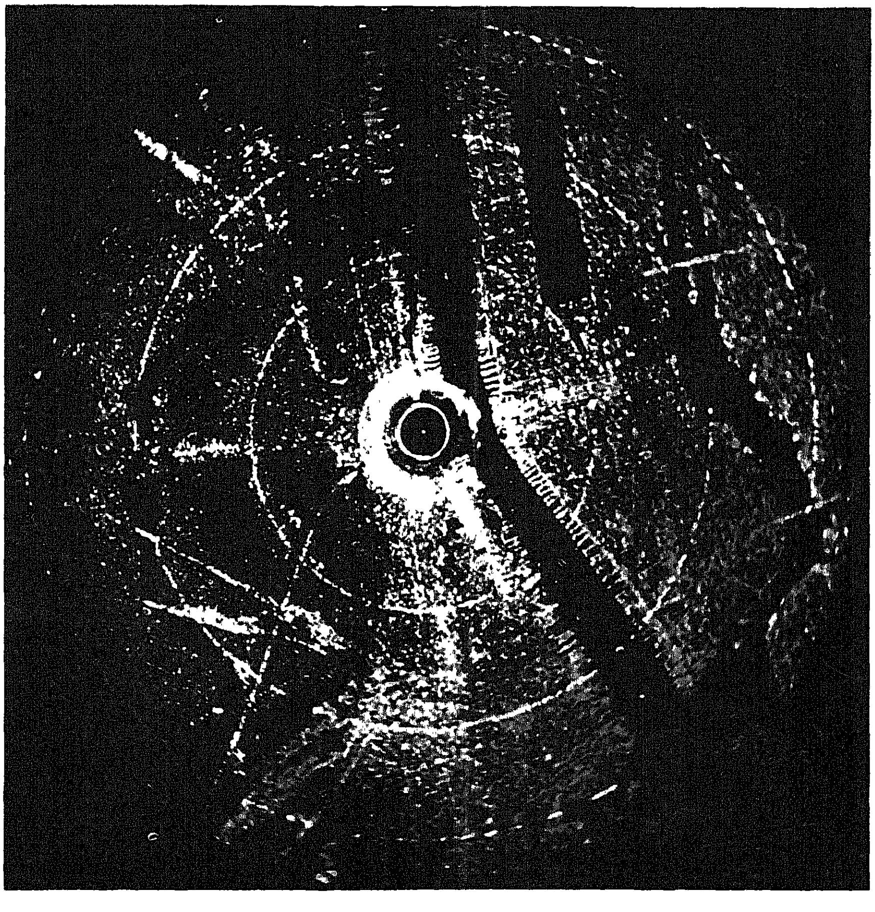
The laboratory staff had begun its exploration of microwave radar before a British mission came to this country in 1940, bringing with it a very high frequency development, called the magnetron, that was capable of generating microwaves of a power theretofore unknown. The mission left the equipment and one of their representatives at the Radiation Laboratory. It was then that the committee decided that the problem was important enough, and promising enough, to require a laboratory of its own and a large staff to work on the problem.

The success of the early warning radar system which can shoulder the burden of spotting dozens of enemy planes within a radius of many miles, and of other radar equipment, is due to the employment of these magnetron and improved microwave appliances.

The waves used are so short that they cannot be carried by ordinary wires and antennae. Instead, they are carried inside a rectangular pipe, or waveguide, from a powerful magnetron to the antenna. Here they are focused by parabolic reflectors, like light waves in a searchlight, and are concentrated into a very sharp beam.

The shape and size of the antenna makes the beam very narrow, giving a very high angular resolution. A large modulator furnishes the transmitter with pulses or bursts of power. These pulses are not measured in seconds, but in terms of millionths of seconds. Any plane within the range of these pulses will reflect them, much diminished, to the antenna and waveguide. There they pass into the receiver, where they are greatly amplified.

The receiver converts the pulses into "video" signals, which can be seen in the indicator on a cathode ray oscilloscope as bright spots of light. Range can be obtained by measuring the time required for the pulse to echo back to the receiver.



THIS IS NEW YORK!—This microwave Radar Scope photograph of the city was taken from a B-17 with new high definition apparatus which was designed for use against Japan and would have provided radar identification of important military objectives. The outline of Manhattan Island clearly shows the Hudson river with its shipping docks. The Metropolitan Museum can be seen jutting out into Central Park. On the New Jersey side of the Hackensack river is clearly visible. At the time the photograph was taken the plane was directly over the spot in the center of the circle. Distance is indicated by the concentric circles used for navigation and bombing.

The Radiation Laboratory succeeded in producing wavelengths even shorter than those produced by the English magnetron. As a result many additional uses of radar were developed. In the summer of 1942, the Laboratory's "sea-search" radar, installed in American and British planes, was patroling the Atlantic ocean. Production sets resulting from it are credited with 50% of the U-boat kills in the Atlantic.

Bombing through overcast by means of radar played a very important part in the destruction of Nazi war essentials. Winter weather over the European continent made necessary the development of some method of putting the bombs on their targets other than by visual means. Radar made blind bombing possible. Both American and British work with radar bombing contributed to the successful radar blind bombing equipment.

In the fall of 1943, about 12 B-17 airplanes equipped with the new radar equipment were sent to England. These planes were to be used as lead aircraft for combat formations, and it was planned that the formation would drop their bombs as directed by them. Trained men from Radiation Laboratory accompanied these radar-equipped planes. Additional blind bombing equipment, much improved, was developed and constructed. It became known as the "Mickey" and proved to be a valuable navigation instrument as well as a blind bombing device.

In principle the "Mickey" set operates like the conventional radar. A pulse of radio energy is sent out from the antenna and at the same time, an electronic sweep starts out from the center of a cathode ray tube. This trace goes out radially, and in the direction in which the antenna points at the moment. Some of the energy pulses are reflected back, amplified, and put on the cathode ray tube. The result is a map of the area beneath the plane.

Ground control approach equipment developed at the Radiation Laboratory will probably have extensive uses in commercial flying to assist planes to runways during overcast and very low ceiling. Early in 1943 the equipment passed exhaustive tests and was accepted by the armed services. It includes two complete radar systems. With one, the operators search the zone surrounding the airport, directing the approaching plane into the sector scanned by the second system. Practically continuous information on the plane's position is thus secured which enables the final controller to guide the pilot down the glidepath by radio. The planes need no special equipment except their ordinary radio equipment.

Science News Letter, September 15, 1945

GENERAL SCIENCE

Expedition Planned

A group of scientists representing the American Museum of Natural History will go to Nyasaland, South Africa, as the first expedition abroad since 1941.

➤ AN EXPEDITION to Nyasaland, South Africa, is planned by the American Museum of Natural History for next April. The museum's first large-scale expedition abroad since 1941 will be led by Arthur S. Vernay, trustee of the museum, who has sponsored numerous expeditions to remote parts of the world for the past 25 years to collect material for exhibition and research.

Southern Nyasaland is one of the few remaining parts of Africa that has not been thoroughly studied by scientists. Mount Mlanje, in the wild and mountainous country south of Lake Nyasa, is a point of especial interest. Specimens of both mammal and plant life will be collected.

Mr. Vernay will be accompanied by Dr. Harold E. Anthony, chairman and curator of the department of mammals; Leonard Brass, botanist; and Capt. Guy Shortridge, director of the Kaffrarian Museum of King William's Town, South Africa.

Although the country abounds in elephant, buffalo, antelope, lion, leopard and other game, the expedition is mainly interested in collecting shrews, mice, squirrels and other varieties of small animals for a complete picture of the mammalian life of this region.

The native plants of Nyasaland are little known, so both dried and pressed plants and living botanical specimens will be collected. This material will go to the New York Botanical Gardens, which is cooperating in the project.

Part of the collections to be made by the Nyasaland expedition will be added to the South African collections of the Kaffrarian Museum, of which Captain Shortridge is director.

The expedition will be in the field for five months, working during the dry season, from May to October of 1946.

Science News Letter, September 15, 1945

Over 5,500,000 *grapefruit trees* were in production in Florida, Texas, Arizona and California in 1942, with approximately 44% of the acreage in Florida.

SCIENCE NEWS LETTER

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PUBLIC HEALTH

Six Dollars a Month

Will pay the family's sickness bills, including hospital, visits to the doctor's office and specialists, under new plan of the United Medical Service.

➤ ALL the family's bills for sickness, injury and childbirth can be paid for $6 a month under a new, expanded medical care plan launched by United Medical Service, in New York.

The $6 monthly cost breaks down into $2 for hospital care under the Blue Cross plan and $4 for the doctor's bills. This covers visits by the doctor to the patient in the hospital or in his home and visits by the patient to the doctor's office. It also includes payments for the services of qualified specialists when the patient's own doctor refers him to one.

Including payments for home and office visits and specialist's services is a new feature in medical care plans. This provision makes the United Medical Service plan the most comprehensive so far offered by any plan for meeting the costs of sickness.

For the present, no more than 25,000 persons will be able to participate in the expanded service, which is being offered to persons enrolled in groups of 50 or more in Associated Hospital Service of New York. If experience during the trial period justifies it, the service will be extended.

Individuals under the new plan will pay 80 cents a month for the hospitalization feature and $2 for the doctor's bills. The family plan serves mother, father and all unmarried children under 18 years. Subscribers will be entitled to one visit a day from a general practitioner up to as many as 20 visits for any one illness, injury or pregnancy case. Additional visits may be authorized by United Medical Service.

The service provides full coverage for families with annual incomes up to $2,500, and individuals up to $1,800, and partial coverage for other enrolled subscribers. Unlike previous plans, contracts for the expanded service will be issued to employers instead of to individual subscribers. United Medical Servive hopes employers will pay the medical service part of the contract if the employee is paying the Blue Cross hospitalization service.

United Medical Service will pay the participating physician $2 for each visit from a subscriber to his office and $3 for each visit he makes to the patient at home or in the hospital. For any call after 8 p.m. the physician may make an additional charge which will not exceed $2 for subscribers in the lower income brackets. For this group of subscribers such payments will constitute the participating physician's entire fee.

Specialists will be paid 50% toward an established base rate fee and will not charge more than the remaining 50% to subscribers with family incomes under $2,500.

More than 8,000 physicians are cooperating in the combined services of United Medical Service, which is sponsored by the Medical Society of the State of New York and 17 county medical societies in the greater New York area.

Science News Letter, September 15, 1945

CHEMISTRY

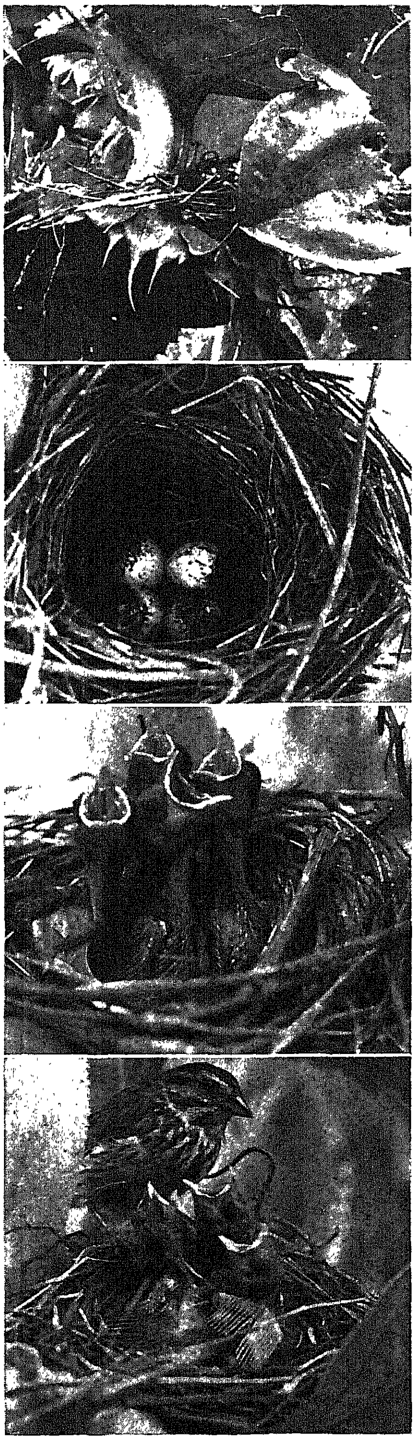
DDT Was First Given Suspicious Reception

➤ WHEN the first shipment of DDT was received in the United States it was given a somewhat suspicious reception, for fear of possible Nazi scheming to let Americans poison themselves with the then strange chemical, Dr. Fred C. Bishopp, assistant chief of the Bureau of Entomology and Plant Quarantine, stated in an address before an audience of physicians.

Not that the shipment came from Germany; it was known to be authentically Swiss in origin. But it appeared to be a nerve poison, and it was thought that the German authorities might have given permission for the shipment to pass through territory which they controlled, in the hope that we might do ourselves some harm with it.

Subsequent tests demonstrated that in the forms in which it was prepared for insecticidal use, DDT is relatively harmless to human beings and other warm-blooded animals. In its first large-scale tests, in a louse-killing dust blown into the clothing of the inhabitants of North African and Italian cities, it stopped a menacing typhus fever epidemic; no subsequent harm to the people has been reported.

Science News Letter, September 15, 1945



"SUNFLOWER SUE"—A friendly little song sparrow selected the rakish rim of a turned-over sunflower head for her nesting site, (top). The cozy nest, lined with animal hairs, contained four bluish white eggs. Out of them came four hungry young. At times it seemed necessary for the mother bird to take time out from her bug-hunting routine. Photographs by George A. Smith, Quarryville, Pa.

ASTRONOMY

Brighter Than Our Sun

The new star in the constellation of Aquila, the Eagle, is 80,000 times as bright as our sun. It is 8,300 light years away.

➤ THE NOVA or new star recently discovered in the constellation of Aquila, the Eagle, (*See SNL*, Sept. 8), is 80,000 times as bright as our sun. It is 8,300 light years, or about 49,000,000,000,000,000 miles away, as reported telegraphically to the Harvard Observatory from the Dominion Astrophysical Observatory at Victoria, B. C.

These values are based on an examination of the spectrum of the nova by Dr. C. S. Beals, Dr. J. A. Pearce, director of the observatory, stated in his wire. The Victoria spectra show strong emission bands that indicate the presence of hydrogen and of ionized iron as well as other elements.

Two shells of matter ejected from Nova Aquilae '45 are moving with velocities of about 1,300 and 800 miles per second, respectively, measurements of hydrogen lines of the spectrum indicate.

The photographic magnitude of the nova was determined at the Oak Ridge Station of Harvard Observatory by two young women students, Anne Hagopian of Radcliffe College and Constance Sawyer, of Smith College. Both were winners of scholarships in the Science Talent Search, conducted annually by Science Service. (*See SNL,* Mar. 18, 1944, and Mar. 13, 1943). Their data indicate that the brightness of the nova on the first few days of September remained practically constant at magnitude 8.5. A Harvard plate taken on Aug. 27, prior to discovery of the nova, gives the magnitude of the nova as 7.2 on that date, according to Dr. S. Gaposchkin.

Science News Letter, September 15, 1945

GENERAL SCIENCE

Russians Follow Our Lead

Their scientists look to us for leadership in reconstructing the Poulkova and Simeis observatories. American models will be used.

➤ RUSSIAN scientists frankly plan to follow the American lead in postwar reconstruction of their enemy-battered institutions, Dr. Harlow Shapley, director of the Harvard College Observatory and president of Science Service, stated in an address at Boston. Dr. Shapley recently returned from Russia, where he was a member of a delegation of American research men who participated in the 220th anniversary of the founding of the Academy of Sciences of the USSR.

The first thing you notice about a Russian scientist, said Dr. Shapley, "is his complete friendliness. You feel at home with him, and with his problems and plans, from the first moment of your acquaintance. The second characteristic that holds the memory is the quiet ambition of the Russian scientist to do a serious and important job."

That Russians now look to America for leadership in science does not mean, however, Dr. Shapley continued, that they expect to do so permanently, or that they have always done so. It was even the other way about, at one time. America's first really big telescope, a 15-inch refractor installed at Harvard College Observatory just a century ago, was an exact duplicate of the one built for the Poulkova Observatory near what is now Leningrad. This observatory, with its more modern equipment, was completely demolished by German bombs and shells during the siege of Leningrad, because it stood only a mile from the front lines on a hill that had to be used as an observation point by the Red Army.

The second of Russia's two great astronomical observatories, at Simeis in the Crimea, was also destroyed, but without any color of tactical necessity, the speaker added: "Apparently it was largely burned, without any military operations in the immediate vicinity, but not until truckloads of scientific equipment had been carried off to Germany. In other words, the place was looted and then largely destroyed. Russian astronomers have heard that the instruments that had been taken to Germany were evidently too badly damaged to be worth returning to Russia, except possibly 'for exhibition purposes' as one of them put it."

In the reconstruction of both these observatories, American models will be followed in the building of telescopes and other instruments; but the whole process is bound to be slow. You cannot hope to rebuild a great scientific institution as quickly as you can an apartment house or a factory, the speaker commented.

Dr. Shapley's address was broadcast over stations of the Columbia Broadcasting System.

Science News Letter, September 15, 1945

PUBLIC HEALTH

Program Urged to Study Rh Blood Incompatibility

➤ THE dramatic achievements of medical skill in saving the lives of babies threatened with death because the Rh factor in their blood is incompatible with the blood of their mothers may be followed by the tragedy of having a living idiot instead of a dead baby. Calling attention to this, the *British Medical Journal* (Aug. 11), editorially urges an extensive program of cooperative research in this field.

Drs. R. R. Race and A. E. Mourant, of the Galton Laboratory Serum Unit of Cambridge, England, have already offered their services and facilities for such a program, it was announced.

The disease caused by Rh incompatibility, erythroblastosis fetalis, is responsible for more deaths than is any other inherited condition—perhaps for more than all of them put together, the editorial states. But studies recently made in the United States show that a much larger percentage of feebleminded children are Rh positive with Rh negative mothers than would be expected on the basis of statistics for the whole population. This indicates that damage to the baby's brain may occur before birth.

"Rh incompatibility," the editorial declares, "raises a problem in negative eugenics second to no other . . . it seems futile to suggest that the 15% of women who are Rh negative should have 85% of the male population barred to them; yet the dangers are relatively great. It is clear that more research is urgently called for along a number of different lines."

Science News Letter, September 15, 1945

ENGINEERING

Rehearsal for Invasion

Laying the pipeline across the English Channel to deliver gasoline to Allies was preceded by 18 months' experimentation in this country.

➤ THE LAYING of a pipeline across the English channel to deliver gasoline and oil to the American and British armies, soon after the Normandy invasion, was preceded by some 18 months of experimentation both in America and in England, the War Department now reveals. The operation was planned and tested in the winter of 1942-43, long before the actual invasion, and 18 months before the first line under the channel went into actual operation.

Colonel John H. Leavell, of Tulsa, Okla., an oil operator of long and successful experience, began work on the idea of a pipeline from England to France in the summer of 1942. The use of undersea pipelines was not a new idea. They had been used in many places to discharge tankers off-shore when no harbors were available. No 30-mile-long underwater pipe, however, had been tried, or any long pipe under 150 feet of water and the great pressure at that depth.

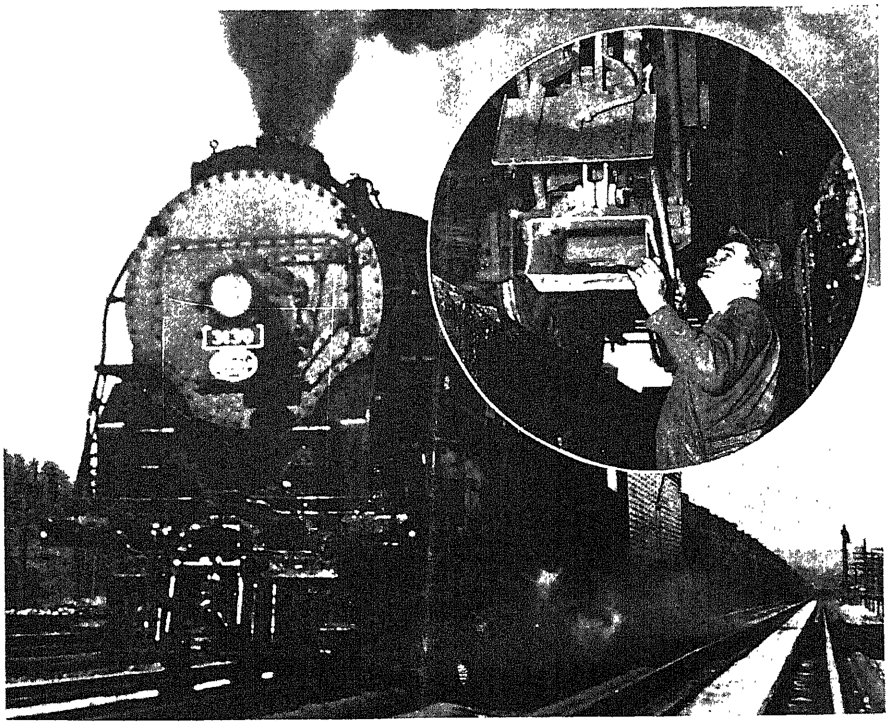
The American experimentation was carried out on a stretch of beach on Martha's Vineyard, an island off the coast of Massachusetts. Ten miles of 4.5-inch extra-heavy pipe were used. One of the basic questions was the effect of friction set up by drawing the long lengths of pipe over the beach and the ocean floor. A 3,000-foot length was dragged 50 miles without undue abrasion and without opening any of the welded joints.

Five one-mile lengths of pipe were assembled adjacent to the shore. One was towed into the ocean and stopped so that the end could be welded to the second one-mile length. This process continued until the five sections were in a single unit, requiring three tow-boats to pull it.

After tests with this five-mile unit were completed, experiments were conducted to determine the practicability of connecting two sections of pipe under water and on the surface. The underwater test was successful in shallow water, but was not suitable for the depths that would be encountered in the English channel. The attempts at surface connections were slow and beset by a number of difficulties.

According to recently published reports, interest in a cross-channel pipeline developed in England also in 1942, the War Department states. This was while plans for invading the continent were being formulated. Experiments under joint English and American auspices developed a flexible pipe similar to the casing of a submarine cable. This was wound on enormous floating drums and unwound as the drums floated across the channel. The first line is reported to have gone into operation on Aug. 12, 1944.

Science News Letter, September 15, 1945



80 MILES AN HOUR!—Water is taken on the fly at jerkwater towns by this New York Central locomotive. When the water scoop was first used, trains had to slow down to 35 miles an hour. It is now possible to take on 5,000 gallons in less than 20 seconds while traveling at 80 miles an hour. As the locomotive reaches the track pan, the scoop is lowered into the trough by a compressed air control. Proper functioning of the scoop, being inspected in the insert, saves precious minutes in meeting train schedules.

ENGINEERING

Underwater Welding Now Photographed

See Front Cover

➤ PRACTICABILITY of welding and cutting underwater has been proven successful by a number of recent applications, such as salvage work on damaged war vessels. However, such work has literally been done in the dark, as no one except the diver or a companion has been able to see the actual operation of this modern technical development of the arc welding process. Now, for the first time, so far as known, underwater welding has been successfully pictured.

Shown in the picture on the front cover of this SCIENCE NEWS LETTER is R. L. E. Cook, representing the Lincoln Electric Company, arc welding under 15 feet of water. The welding is being done with a mild steel electrode having a special coating that is impervious to water.

The photograph was taken through a porthole in the specially designed tank used for training welders in underwater welding and cutting operations in the Mechanical Division of the Panama Canal Zone Authority.

Science News Letter, September 15, 1945

GENETICS

Plants Springing Up In Atom-Blasted Cities

➤ PLANTS, reported growing already on the sites of the Japanese cities blasted by atomic bombs, should be examined by trained geneticists for possible clues to the truth or falsity of the "death-ray" stories diligently propagated by the Japanese press and radio, seemingly as a bid for sympathy.

If the soil in which they are growing really was so impregnated with radioactive substances that it is still giving off secondary radiations dangerous to human and other life, effects should show up in the plants, as a higher-than-average occurrence of mutations or "sports"—sudden evolutionary changes appearing in seedlings from seeds that will be borne by the plants now growing.

Changes of this sort have been induced experimentally in the past, by bombarding the seed-forming organs of plants with X-rays, radium radiations, etc. If such changes do not appear, or are not unusually numerous, additional doubt will be cast on the Japanese "horror-ray" stories.

Science News Letter, September 15, 1945

ASTRONOMY

Evergreens Will Greet Visitors to Mars

➤ ADVENTUROUS travelers to Mars in the 21st century may welcome the sight of familiar evergreen plants which Prof. Gabriel A. Tikhoff of Tikhoff Observatory, Leningrad, believes exist on the planet.

In addition to the polar caps of ordinary ice and the moist green areas which flourish in early summer, there are other regions on the planet where plants grow that retain their color throughout the winter, Prof. Tikhoff states.

Replying to opponents of the theory that plants live on Mars, Prof. Tikhoff said that conifers reflect the infrared rays of the sun less readily than deciduous trees, which lose their foliage every year. Since conifers are believed to protect themselves from winter's cold by this reduced reflection of infrared rays, which carry considerable heat energy, he stated, this feature would probably be even more strongly developed on Mars. This would account for the absence of great brilliance in infrared photographs of the planet.

This winter Prof. Tikhoff plans to investigate further the plant life of Mars, he reported to the Soviet Scientists Anti-Fascist Committee. He will photograph the spectrum of various types of foliage from mountainous altitudes.

Science News Letter, September 15, 1945

CHEMISTRY

Peanuts Keep Best at Moderately Low Humidity

➤ PEANUTS and peanut candy spoil soonest when humidity is high, keep best when it is held at a controlled level of about 60%, Dr. J. G. Woodroof and associates at the Georgia Experiment Station have discovered.

Best thing to do with freshly harvested peanuts, they found, is to dry them rapidly. A current of hot air at 130 degrees Fahrenheit for about eight hours was found adequate for the purpose. After that, the moisture content of the peanuts themselves should be held as close to 5% as possible.

Best moisture percentages for various peanut products were found to be: roasted peanuts, 1.5%; hard peanut candies, 2%; soft peanut candies, 5%; peanut flour, 4%.

Salted peanuts, which are roasted in oil, keep better if the processing is done in fresh oil. Peanuts roasted in re-used oil tend to spoil more readily in moist atmospheres.

Science News Letter, September 15, 1945

CHEMISTRY

Rubber-Film Linings For Shipping Caustics

➤ SHIPMENT of caustic soda and caustic potash in metal drums or tank cars is made safer and more satisfactory by a simple process whereby they are given rubber-film linings, covered by patent 2,384,111, which was obtained by Dwight Means of Wadsworth, Ohio, assignor to the Pittsburgh Plate Glass Company.

It is customary to fill containers with the caustics in molten form, and to heat them again when preparing to empty them. In their heated state the caustics are highly corrosive, which not only increases risks in handling them but introduces iron from the container as an impurity in the chemical. Mr. Means remedies this by coating the inner surface of the container with rubber latex in which sulfur and other vulcanizing materials are already incorporated. When the hot caustic is poured in, the heat suffices to vulcanize the rubber into a firm, impermeable protective surface.

Science News Letter, September 15, 1945

MEDICINE

Old Indian Arrow Poison Tried as Polio Remedy

➤ THE USE of curare, the old Indian arrow poison, in the treatment of infantile paralysis is reported by Dr. Nicholas S. Ransohoff, of Long Branch, N. J., in the *Journal of the American Medical Association*, (Sept. 8).

The arrow poison was tried in four consecutive cases at Monmouth Memorial Hospital. "Striking improvement of the symptoms" was obtained, Dr. Ransohoff states.

Physicians do not ordinarily report on the value of a treatment that has been tried in only four cases, but Dr. Ransohoff states that he is making this "preliminary" report because "there is a great deal of infantile paralysis in the country at the present time and it is hoped that other observers will use this drug."

Science News Letter, September 15, 1945

METALLURGY

Process Promises Better And Brighter Tinplate

➤ BETTER and brighter tinplate, for cans, bottle caps and a thousand other uses, is promised by a new process on which U. S. patent 2,384,086 has been issued, to Charles E. Glock of Baltimore. The tin is deposited on the steel or black-iron sheet as the latter is passed vertically through an electrolytic bath in a continuous strip. After being coated, the sheet is cold-rolled at very high pressure—250,000 to 500,000 pounds are the figures given by the inventor—at speeds up to 2,000 feet a minute. The metal is slightly elongated during the rolling, increase in length being on the order of 5/32 inch for every 25 inches.

Because the plate is at no time brought into contact with oil, its surface is kept in good condition to take printing or lithographing, often used on can labels and bottle caps. During the process a film of water is maintained on the surface, to protect it against oxygen in the air and prevent incipient rusting.

Mr. Glock has assigned his paten rights to the Crown Cork and Seal Company.

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FIELDS

ASTRONOMY

Earth and the Universe Of About the Same Age

➤ THE EARTH'S crust solidified some three thousand million years ago when millions of galaxies, stars and stellar dust particles were closely packed together, estimates Dr. Harlow Shapley, director of the Harvard College Observatory. The age of the earth's crust is not at all insignificant compared with the creation of the universe, he believes.

Measurement of the ages of the oldest rocks on the earth is likewise a measurement of the total duration of the earth itself, Dr. Shapley states, for the earth quickly changed from the normal, hot, ionized, turbulent, gaseous state of stellar matter to the relatively cold, dead, crusted body of a small or medium-sized planet.

Any earth-sized gaseous or liquid body, isolated in sidereal space, would freeze into solid matter (rocks) practically instantaneously in terms of cosmic time, Dr. Shapley points out in the *American Journal of Science.*

Science News Letter, September 15, 1945

ENGINEERING

Compact Unit Makes Pure Water for Soldiers

➤ A STATIONARY unit capable of purifying 72,000 gallons of water a day can be shipped, knocked down, in eight large crates that fit into one-half of a box-car. Widely used to furnish our troops with drinking water, both at home and in the Pacific area, each unit is the equivalent of the average small town municipal water works.

Where it takes six months to a year to purchase and install the water supply plant for a small town, the Army unit of similar capacity can be set up, by unskilled labor, in two days, the War Department states.

The unit was developed under the direction of the Chief of Engineers three years ago to insure the purity of water at new camps. The Army already was using the portable type of purifier and the mobile unit, but the Engineers wanted a larger plant, capable of supplying a whole camp with potable water.

Exactly 72 hours after the rough sketch was drawn, the first unit had been manufactured, assembled and was operating. Within six days a new factory had been set up by Wallace and Tiernan of Newark, N. J., to manufacture the units.

Pupils in manual training classes, instead of enjoying a summer vacation, were hired as workers and their instructors as foremen. A three-shift day was established and the youngsters raced each other to see which shift could produce the most in eight hours. The contract was completed and the hundredth carload left the plant 44 days after the project was launched. Most of the workers went into the Army and many of them operated the plants abroad.

The unit requires five gasoline-driven pumps. Two "low lift" pumps pick up the water from the source, while two "high lift" pumps force it from the filter to the distribution system. A high-capacity pump backwashes the filter to remove the dirt taken from the water.

Alum, soda ash and chlorine are all added as soon as the water is taken from the source. It passes through flocculation baffles which mix it up. Floc formed by the alum traps foreign material in the water and it then passes to the filter which removes the remaining material. The water is again chlorinated to insure sterilization. Part of the clear water is stored for washing the filter which must be cleaned with pure water.

The plant has controllers, regulators and indicators to show the volume of water, amount of chemicals added and other features which make it practically foolproof.

Science News Letter, September 15, 1945

INVENTION

Modified "Iron Lung" For Polio Patients

➤ INFANTILE paralysis victims who require artificial aid in breathing are promised an improvement over the usual type of "iron lung," in an invention by Dennis R. Scanlan of St. Paul, Minn., on which U. S. patent 2,383,821 has been granted. Instead of enclosing the patient's body in a metal chamber, with only his head projecting, the new device encloses the torso only, and consists mainly of rubber or other flexible material, with only a metal breastplate through which the necessary respiratory movements are transmitted. The patient is able to move his limbs with considerable freedom, and to have his bed raised to varying reclining angles, thus escaping the monotony of lying flat on his back all the time.

Science News Letter, September 15, 1945

HERPETOLOGY

Garden Snake Litter Measures Over 32 Feet

➤ FIFTY-TWO offspring of a 36-inch garter snake, if placed end to end, would measure over 385.7 inches in length. Since common garter snakes in Ohio usually have from 14 to 30 young, a litter of 57, only three of which were stillborn—and two escaped before they could be measured—is quite unusual, John Thornton Wood of the Dayton Public Museum states in the scientific journal *Copeia.* While the average total length of the young snakes was 7.4 inches, the shortest was 6.65 inches and the longest 8.0 inches.

Science News Letter, September 15, 1945

ASTRONOMY

Passage of Meteors Recorded Automatically

➤ PASSING meteors or "shooting stars" can now be recorded automatically and their brilliance measured by an apparatus which includes two photo-electric cells in a balanced circuit. This is the first known electrical recording of meteors, according to Dr. C. W. Gartlein, of Cornell University, who designed the apparatus with Joseph C. Logue of the school of electrical engineering. In the past information concerning meteors was obtained from visual observations.

The photo-electric cells are "aimed" at different portions of the sky, and are so synchronized that when one cell intercepts light which is brighter than that being received by the other, a recording pen on the graph is set in motion.

The jagged line made by the pen not only records the presence and duration of a meteor in the field covered by the photo-electric cell, but also gives a reading of the brilliance of the light. This may be measured accurately by comparing it with the amount of light received by the other cell at the same moment.

Meteors recorded during a meteor shower this August were between zero and one magnitude of brilliance, or about as bright as the star Vega, which is overhead at this season.

The apparatus was designed in connection with the work being done at Cornell on the aurora borealis. Dr. Gartlein said it offers the possibility of counting meteors automatically, eliminating the necessity of observers, and also obtaining more accurate measurement of meteor brilliance.

Science News Letter, September 15, 1945

PHYSICS

Precious Waste Products

What is left after the atomic bomb is produced will open up entirely new fields of medicine and in the treatment of disease.

By CALVIN MOORES and MARJORIE VAN DE WATER

➤ SPLITTING the atom is the greatest scientific achievement of our age.

But the greatest immediate contribution of this research to peacetime living is probably in what were the waste by-products of the Army's atomic plants.

The radioactive substances that were merely a troublesome problem of separation and disposal in the process of making an atomic bomb, will open up entirely new fields of medicine and may supersede X-rays for use in industry to look through metals for hidden defects.

The power that is released by the shattering of uranium atoms may also find special uses. Atomic power might be used to run giant power plants—possibly in countries now undeveloped because they do not have common fuels such as coal.

You will not have an atomic furnace in your basement. Nor will you be able to "fill 'er up" with atoms at the corner filling station. Airplanes will not be sent rocketing through space on the backfire of a bomb such as dropped on Hiroshima.

The terrific heat generated by atomic explosion would not only melt, but vaporize the airplane. And if you had an atomic power generator small enough to fit under the hood of your car, when you stepped on the starter you would blow your whole town to atoms. That is because the only small atomic power generator that we know is the atomic bomb.

Power Under Control

Scientists are now producing stupendous amounts of power under control, but this requires huge plants such as the one on the Columbia River at Hanford, Wash.

In this plant, the energy is being considered as a waste by-product and is being thrown away into the Columbia River in the form of heat. This plant, designed for the production of plutonium for use in the atomic bomb, produced the equivalent of 1,500,000 kilowatts in wasted heat for each kilogram of plutonium in the daily output. The ultimate capacity of the hydroelectric plants at the Grand Coulee Dam is expected to be only 2,000,000 kilowatts.

The steps in producing plutonium are roughly these:

1. Raw material in the form of uranium metal is fed in. A small part of this is uranium 235, a larger part is "ordinary" uranium 238.
2. Atoms of uranium 235 are exploded, producing neutrons. Heat and radioactive substances are by-products.
3. Some of the uranium 238 is converted by neutrons into uranium 239.
4. Uranium 239 changes to neptunium 239.
5. Neptunium 239 changes to plutonium 239. Plutonium, in this plant, was the end product and was chemically separated from the unchanged uranium and the radioactive waste products. But since only a small fraction of the original uranium was used up—
6. As a final step the uranium could be recovered and fed in again to repeat the process.

Heat Is By-Product

But in a power plant it is probable that the plutonium would not be removed. Part of the plutonium would explode along with the uranium 235, producing enormous quantities of heat, and the rest would be converted into uranium 235 which makes the process a complete cycle. In this way eventually all the uranium 238 is converted into plutonium and uranium 235 which are burned up and changed to heat.

The atomic power plant of the future can be built using many of the principles of the Hanford plant for making plutonium. But in addition to the apparatus for splitting atoms it must have steam turbines, generators and condensers like those used in a conventional steam generating power plant. Moreover, location on a river, with its cooling water available for the condensers, will still be necessary.

The familiar apparatus is necessary along with power transmission lines, because the heat produced by splitting atoms is of no use to you in your home until it has been converted into electricity and delivered to your light bulb, toaster or washing machine.

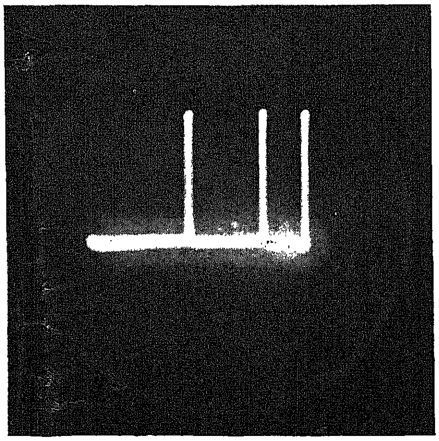
The uranium atoms substitute only for the coal or other fuel, and require a much more complicated furnace to burn them in. But, nevertheless, they might not be more expensive.

Natural uranium may be expected to cost somewhere in the neighborhood of $22 a pound. Coal would not be more than that by the ton at retail. But 140 pounds of natural uranium contain only one pound of U-235. You can get 1,000 times as much electric power from a pound of uranium 235 as you can from a ton of coal.

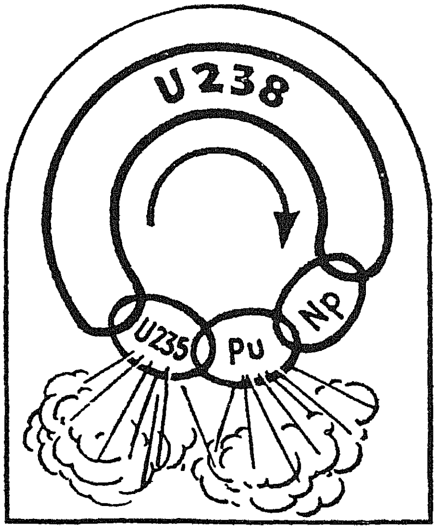
For the present-day consumer this saving would be swallowed up by the great cost of converting the heat to electricity and delivering it to factory and home. In a coal-powered plant, the fuel cost is only one-tenth of the price of the electricity to the consumer. Therefore atoms for fuel could not reduce your bill more than about 10 per cent.

The processes of generating electricity from heat and power transmission are not expected to be changed greatly by the coming of atomic power.

The heart of the atomic power plant, the uranium disintegrator, consists of a sphere built up of graphite blocks. It may be between 20 and 30 feet in diame-



ATOMIC PULSES—In 1939, uranium atoms were first split experimentally, with slow neutrons and much atomic energy released. When the energy is detected and put into an oscillograph, electrical pulses can be seen which closely resemble those shown.



CHAIN REACTION—A small proportion of uranium metal consists of U-235, a larger part is U-238. By splitting the uranium atoms, tremendous power is generated, in an endless chain process.

ter. Graphite is the stuff your "lead" pencil is made of. Into tunnels cut through the graphite sphere are pushed ingots of uranium metal just as it is purified from the ore.

From this point on natural atomic processes, aided by the graphite surroundings, cause some uranium atoms to blow up, releasing power and in turn causing other uranium atoms to blow up in a sort of endless chain.

These atomic explosions cause heat, and this heat can be picked up by circulating a cooling liquid in channels around the uranium ingots. The coolant is then brought out and used to produce steam in a high-pressure boiler. The steam may then be used to operate a conventional turbo-electric generator. Cooling water is then necessary to condense the steam and repeat the cycle.

The astonishing process of apparently spontaneous combustion of the uranium atoms is made understandable by the best present conception of atomic structure and behavior.

Uranium is a hard, heavy, white metal. It is a chemical element and therefore the atom is the smallest unit of it; if you smash the atom you no longer have uranium. All atoms have standard interchangeable parts.

In the heart, or nucleus, of the atom there are protons and neutrons, and it is the number of protons in an atom that determines which element it is. Some uranium atoms have more neutrons than others and are therefore heavier. The two most abundant kinds of uranium have atomic weights of 235 and 238, one type having three more neutrons than the other in the atom. The uranium of weight 238 is 140 times as plentiful as uranium 235.

Ordinarily an atom nucleus is very stable and cannot be broken up except when it is struck with great force by an object smaller than the atom, that is, a part of another atom, for example, a neutron. When the atom bursts, its parts fly out and these may, in turn, strike other atoms.

When the uranium ingots are pushed into the graphite sphere any stray neutron which finds its way to a uranium 235 atom will cause it to blow up and shoot out three new neutrons at high speed. These high-speed neutrons are slowed down by successive collisions with the carbon atoms of the graphite. They collide an average of 200 times and then at low speed find their way back to another uranium 235 atom, producing another explosion.

If the neutron is going neither too fast nor too slow but is slowed down to a medium speed when it strikes a uranium 238 atom, it may not shatter it. It just sticks and makes it uranium 239. This is unstable and turns into neptunium 239, which lasts only a few minutes before it turns into plutonium.

The possible uses of plutonium other than as a super-explosive have not been explored, or at least have not been made public. It is radioactive. It will be difficult to store or transport because except in small amounts it would blow up. It may be that its only usefulness will be in scientific laboratories. It would make possible a small-sized substitute for the giant atom smashers for producing neutrons.

The "waste" by-products of an atomic power plant are the poisonous and intensely radioactive substances, some of which are gases. But it may very well turn out that in the future extremely important uses will be developed for these. Physicians may find that they can be used to treat diseases in new ways or as a substitute for precious radium. They may be used in factories in place of X-rays to detect flaws in large castings.

Nearly all the research leading up to the atomic bomb was focused on the splitting of uranium atoms. There is a possibility, however, that the atoms of other elements may be split with equally spectacular results.

It is not likely that we will be able to explode for power production the atoms of common materials such as water, iron, carbon or even lead. It was not an accident that uranium was first used—the atom of uranium is the heaviest of the elements occurring in nature and therefore could produce lots of energy. Moreover, the uranium atom is comparatively easy to split.

While physicists and the public, especially the Japanese public, are very much impressed with the terrific power of the new atomic weapons, other scientists who deal with such natural phenomena as earthquakes, volcanoes and hurricanes are not so greatly awed because compared to these natural catastrophes an atomic blast does relatively little damage.

That is because these natural phenomena get their energy indirectly from the biggest atomic furnace in our section of the universe—the sun.

Science News Letter, September 15, 1945

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Do You Know?

Oxygen is the only element taken by higher organisms in the free state.

Phosphate fed to cattle results in more calves and greater butchering weight.

The *wood bison* is larger, darker in color, and shaggier than the bison found on the Plains.

Seacows are not whales but a distinct group of mammals that have taken to the sea; they are related to the elephants.

Potatoes, one of America's principal food crops, are grown in every state and territory; the 1944 crop was nearly 380,000,000 bushels, of which Maine produced 53,000,000 bushels and Idaho 36,000,000 bushels.

Silica gel, an inexpensive chemical now used inside packages of instruments or machinery to absorb moisture in the air, may soon be used in air-conditioning units to lower the humidity in offices and homes.

Tannin from American sumac will produce light-colored leathers similar to those obtained with imported sumac if the leaves are dried rapidly either by spreading them out in the sun or by artificial heat.

Pears are one of the most satisfactory products from which yeast is made; one pound of starter in the proper media will increase to 64 pounds in 24 hours and requires only a 2% solution of sugar to propagate the yeast.

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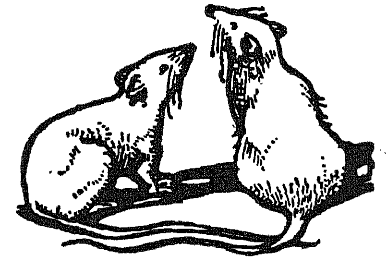
ZOOLOGY

NATURE RAMBLINGS

by Frank Thone



Super-Rough-on-Rats

➤ A NEW chemical rat-killer, released from under wartime wraps, appears to be just about as deadly to rodent pests as DDT is to flies and mosquitoes. It was developed by chemists and biologists of the U. S. Fish and Wildlife Service at the Patuxent Research Refuge near Washington, D. C., and at the Wildlife Research Laboratory near Denver. First report on the new rodenticide is given by E. R. Kalmbach of the Denver laboratory, in *Science* (Aug. 31).

Chemically, the poison is sodium fluoroacetate. For convenience, it is known by a number, 1080—it was the thousand-and-eightieth in a long series of toxic materials tried out, under a transfer of funds from the Office of Scientific Research and Development.

The new ratbane seems to be the deadliest stuff ever tried out for the purpose. In carefully controlled tests, it has been able to kill the common Norway rat in concentrations as low as five milligrams per kilogram of body weight, Mr. Kalmbach states. That means that if a rat weighing half a pound swallows a pinpoint speck of it weighing less than two ten-thousandths of an ounce, he will die. To certain other rodents, such as prairie dogs, 1080 is deadly in even smaller doses.

One advantage of 1080 is its easy solubility in water. This make it possible to dilute it down to manageable doses, and probably also to add disguising scents or tastes in case rats become too wary. However, the latter precaution should not be necessary: if a rat-infested area is properly baited with 1080 there will be no survivors to teach a younger generation caution. The high solubility of 1080 also makes it possible to offer it to rats in simple water baits; a third of an ounce in a gallon of water has proven quite effective in field tests.

If it has any taste to rats, it must be because they have a more acute sense of taste than human beings. A bit of the pure chemical, well below the toxic level for human beings, was tried out by Dr. Ray Treichler of the Fish and Wildlife Service, now on duty with the War Department, and he stated that he could not taste anything at all.

The deadliness of 1080, however, should not be played down, all workers with the stuff agree. One rat died in exactly 20 minutes after drinking water containing it, and at the end of two hours about a score of dead rats were picked up in the vicinity. It is no respecter of animals, and will kill pet dogs and cats, and possibly game and livestock, if they inadvertently get hold of it. For this reason, it is unlikely to be put on the market for general household use, but is more likely to be put in the hands of professional rodent-killers who wage campaigns against rats among wharves, granaries and warehouses, and against too-numerous prairie dogs and ground squirrels on western rangelands.

The high dilution in which 1080 can be used is one thing that will make it less dangerous, Dr. Treichler pointed out. It would be necessary for a man to eat six ounces of an ordinary bait containing it to get a lethal dose. If a little is swallowed it is soon excreted; its effects are not cumulative like those of many other poisons. Moreover, it is not absorbed through the skin like one of the rodenticides now in general professional use; this is a very great practical advantage in field handling.

Science News Letter, September 15, 1945

The *Peruvian Andes* differ strikingly from the American Rockies in the absence of a timbered zone.

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GENERAL SCIENCE

Cooperation Growing Among Scientists

➤ INTERNATIONAL cooperation among scientists of the Americas has grown rapidly during the war, and is expected to continue its increase now that peace has come, Dr. Raymund L. Zwemer, executive director of the Interdepartmental Committee on Cultural and Scientific Cooperation, Department of State, told his audience in a radio address. Subjects covered range through the whole alphabet of science from anthropology to volcanology.

As a concrete example, Dr. Zwemer cited the joint program of research carried on by Mexican and American scientists on the new volcano Paricutin. This has involved not only volcanology but many other sciences, from the related ones of seismology and geology to some that at first would hardly be thought of in connection with volcanoes, such as botany and soil conservation.

As another example, the speaker mentioned a three-cornered cooperative project fostered by the Weather Bureau, involving Cuba, Mexico and the United States. Much of the weather we get in this country is bred in the Caribbean and Gulf areas, and without the assistance of Cuban and Mexican meteorologists we would not be building up the better knowledge of weather conditions in these southern waters that is vitally needed in all three countries.

Dr. Zwemer spoke as the guest of Science Service on the "Adventures in Science" program broadcast by the Columbia Broadcasting System.

Science News Letter, September 15, 1945

WILDLIFE

Oyster Crop Short Again Because of Manpower Lack

➤ OYSTERS will be far from plentiful again this year, the U. S. Fish and Wildlife Service has announced after a survey of the principal oyster areas of the Atlantic and Gulf coasts. The only bright spot in the otherwise dim prospects is the Long Island region, where carefully tended oyster beds are bringing to maturity the crop that was set in 1940 and 1941.

Lack of manpower to take care of the shellfish while they are growing and to bring them in when they reach marketable size is an outstanding factor in the shortage. In one important oyster area, in the neighborhood of Hampton Roads, Va., increased water pollution due to wartime industrial activity has been an additional factor in decreasing oyster yield.

Science News Letter, September 15, 1945

INVENTION

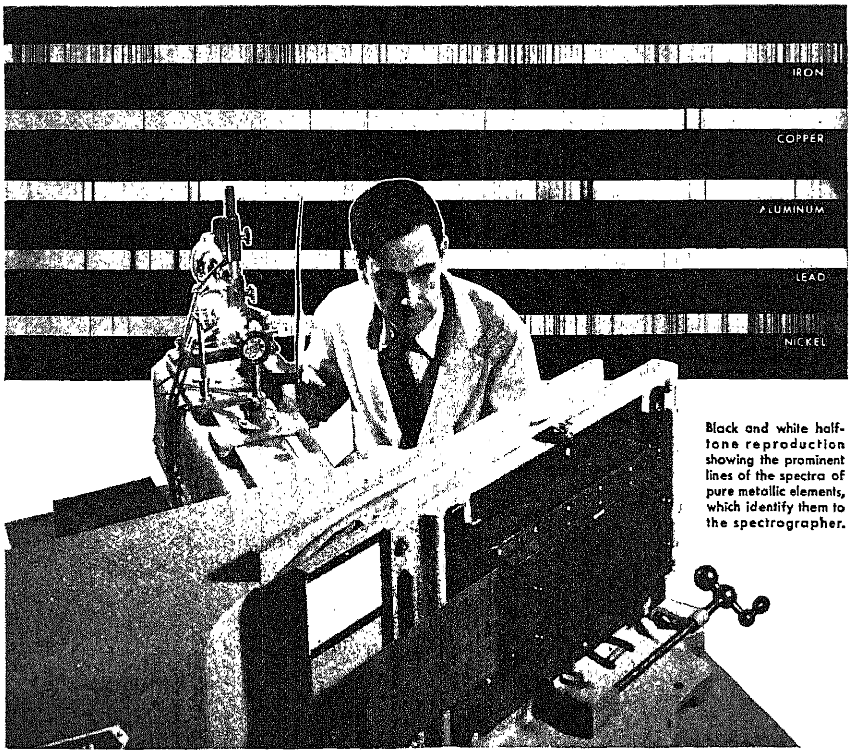
Combined Scouring And Polishing Powder

➤ A COMBINED scouring and polishing powder, covered by patent 2,384,006, is the invention of Joseph M. Bleakney of Manhasset, N. Y. It incorporates sawdust, to make it lighter and less scratchy in its action; other ingredients are diatomaceous earth, soap powder and a binder.

Science News Letter, September 15, 1945

The *guinea pig,* standard laboratory helper, came originally from Peru.

Sugar helps preserve the color and flavor of canned fruit, but if sugar is not available, the fruit may be canned unsweetened and sweetened when used.



Black and white halftone reproduction showing the prominent lines of the spectra of pure metallic elements, which identify them to the spectrographer.

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• Books of the Week •

THE CHARACTERIZATION OF ORGANIC COMPOUNDS—Samuel M. McElvain—*Macmillan,* 282 p., illus., $3.40.

THE FALLING SICKNESS: A History of Epilepsy from the Greeks to the Beginnings of Modern Neurology—Oswei Temkin—*Johns Hopkins Press,* 380 p., illus, $4.

500 POSTWAR JOBS FOR MEN—Vocational Guidance Research—*Doubleday,* 285 p., $2.50. A dictionary of 500 different kinds of jobs, listed alphabetically.

A GENERAL ACCOUNT OF THE DEVELOPMENT OF METHODS OF USING ATOMIC ENERGY FOR MILITARY PURPOSES UNDER THE AUSPICES OF THE U. S. GOV'T., 1940-1945—*H. D. Smyth,* 169 p., paper., $1.25. Cloth, $2. Written at the request of Major General L. R. Groves, U. S. Army. Reproduction in whole or in part is authorized and permitted.

MAN'S MOST DANGEROUS MYTH: The Fallacy of Race—M. F. Ashley Montagu—*Columbia Univ. Press,* 304 p., $3.25. 2nd ed., revised and enlarged, with a foreword by Aldous Huxley.

PROCEDURE HANDBOOK OF ARC WELDING DESIGN AND PRACTICE—*Lincoln Electric Co.,* 1282 p., illus., $1.50. 8th ed., revised and enlarged.

PROGRAM PATTERNS FOR YOUNG RADIO LISTENERS IN THE FIELD OF CHILDREN'S RADIO ENTERTAINMENT—Dorothy Lewis and Dorothy L. McFadden—*Nat. Assoc. of Broadcasters,* 80 p., paper, free. For use by radio stations and writers of children's programs.

RADAR: A Report on Science at War—*Supt. of Doc.,* 53 p., paper, 15 cents. Released by the Joint Board on Scientific Information Policy for the Office of Scientific Research and Development, War Dept., and Navy Dept. Distributed through the facilities of the Office of War Information.

RADAR: An Official History of the New Science with Technical Descriptions and Glossary of Radar Terms—*British Information Services,* 30 p., paper, free.

Science News Letter, September 15, 1945

GENERAL SCIENCE

Laboratories for India

➤ NINE specialized laboratories for industrial and scientific research are recommended for India, to be erected during the next five years, by an Indian Industrial Research Planning Committee, it is revealed by the information service of the Government of India. A technological institute on the lines of the Massachusetts Institute of Technology is included in the recommended program for scientific development, and also a $6,000,000 grant to the scientific departments of India's 18 universities to be used in training 700 research workers in the next five years.

The Industrial Research Planning Committee was appointed in 1944 by the Government of India's Council of Scientific and Industrial Research to make a comprehensive survey of existing facilities for scientific and industrial research and to report on necessary measures of development, coordination and control of various research agencies in India.

Members of the committee visited the United States in 1944, inspected American research undertakings and consulted with American scientists.

The Indian committee recommends for control a National Research Council, consisting of representatives of scientific bodies, universities, industry, labor and administration. The council, in addition to its duties in maintaining national research activities and stimulating research by private organizations, would also serve as a national trust for patents and set up a board of standards and specifications.

Science News Letter, September 15, 1945

STATISTICS

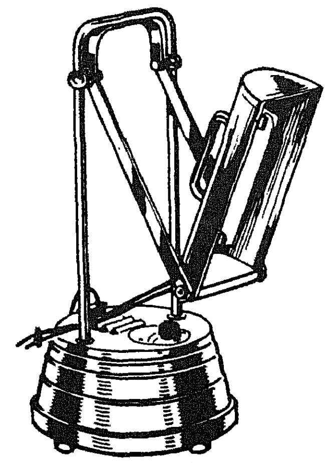
College Men Marry Well-Educated Girls

➤ ALTHOUGH most men marry girls with less education than they have, the more educated a man is, the more likely he is to choose a wife who also has more than average education, Paul H. Landis and Katherine H. Day, State College of Washington, report in the *American Sociological Review.*

Most of the college students they studied, both men and women, married within the same general educational level as their own. Of 330 students in the entering class of 1936 at the State College of Washington, 71.5% picked a bride or groom with training beyond high school. Only 1.5% married persons with only elementary education, while 27% married persons with high school training.

Science News Letter, September 15, 1945

Deep water in four of the five *Great Lakes* is below sealevel.



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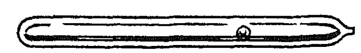

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THE BIRD WITH THE 16-MILE TAIL

The wire you see with the parachute on the end of it is a telephone wire, being payed out from a C-47 plane.

Bell Telephone Laboratories, working with the Air Technical Service Command of the Army Air Forces, developed this idea. It will save precious lives and time on the battlefield.

A soldier throws out a parachute with the wire and a weight attached. The weight drops the line to the target area. From then on, through a tube thrust out the doorway of the plane, the wire thrums out steadily — sixteen miles of it can be laid in 6 2/3 minutes. Isolated patrols can be linked quickly with headquarters. Jungles and mountains no longer need be obstacles to communication.

This is in sharp contrast to the old, dangerous way. The laying of wire through swamps and over mountains often meant the transporting of coils on the backs of men crawling through jungle vegetation, and in the line of sniper fire. It is reported that in one sector of the Asiatic theater alone, 41 men were killed or wounded in a single wire-laying mission.

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BELL TELEPHONE LABORATORIES

Exploring and inventing, devising and perfecting for the Armed Forces at war and for continued improvements and economies in telephone service.

• New Machines and Gadgets •

☸ BACK WASHER, for use in a bathtub, is an endless scrubbing-towel passing over a lower immersed roller and an upper motor-driven roller. A framework straddles the tub to hold the device in position. An electric motor rotates the upper roller, dragging the wet towel upward against the bather's back.

Science News Letter, September 15, 1945

☸ TWEEZERS for plucking eyebrows or pulling out splinters have a small flashlight for a handle. The gripping jaws are fashioned from a resilient plastic of the type capable of piping light to the points of the jaws, giving illumination where most needed.

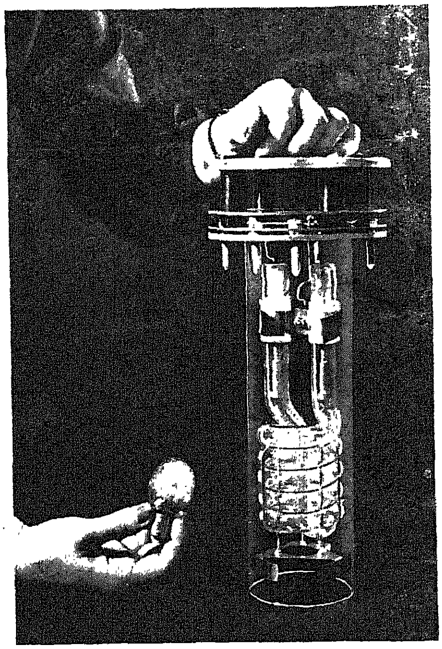
Science News Letter, September 15, 1945

☸ PACKING BOXES, developed by the Army particularly for Pacific area shipments, are made of single-ply panels, consisting of 1/16 inch hardwood, faced on both sides with Kraft board. The facing, bonded to the wood with a water-resistant glue, is uninjured by water.

Science News Letter, September 15, 1945

☸ FROZEN food container, about the same size and shape as the familiar chocolate can, is made of paraffin-impregnated fiber board with ends of light tinplate. After one corner of an end is pried up with a knife or hook opener, it can easily be peeled off.

Science News Letter, September 15, 1945



☸ REPEATING flask tube shoots, with machine-gun-like rapidity, brilliant "bolts of lightning" from warplanes fitted with special electronic equipment. The tube, shown in picture beside a photo-flash bulb, permits taking countless night aerial photographs of any territory from altitudes up to two miles.

Science News Letter, September 15, 1945

☸ CATHODIC protection rectifiers reduce the corrosion of underground metal structures, caused by electric currents set up by chemical action between the metals and substances in the soil, by setting up a counter-current. The apparatus has no moving parts, and therefore needs little attention.

Science News Letter, September 15, 1945

☸ MILLINERY for 1946 may be made of a new synthetic straw fabric knitted with lustrous rayon yarns alternating with dull ones to give it a crystal-like sparkle. The fabric is treated with a water-repellent which also makes fingermarks and dust easily removable.

Science News Letter, September 15, 1945

☸ PERISCOPE gun sight, used in some fighter planes, has two viewing ends, one above the plane, the other below. A flip-over mirror transfers the gunner's line of sight from one to the other. When the periscope tube is rotated to scan the sky, the gun turrets move with it.

Science News Letter, September 15, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 276.*

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Question Box

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How is the passage of meteors recorded automatically? p. 169.

What new star is 80,000 times as bright as our sun? p. 166.

CHEMISTRY

Why was DDT given a suspicious reception? p.165.

Under what conditions do peanuts keep best? p. 168.

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How long did it take to prepare the pipeline across the English Channel prior to the invasion? p. 167.

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PHYSICS

For what can the waste products from making the atomic bomb be used? p. 170.

PUBLIC HEALTH

What is the six-dollar a month plan? p. 165.

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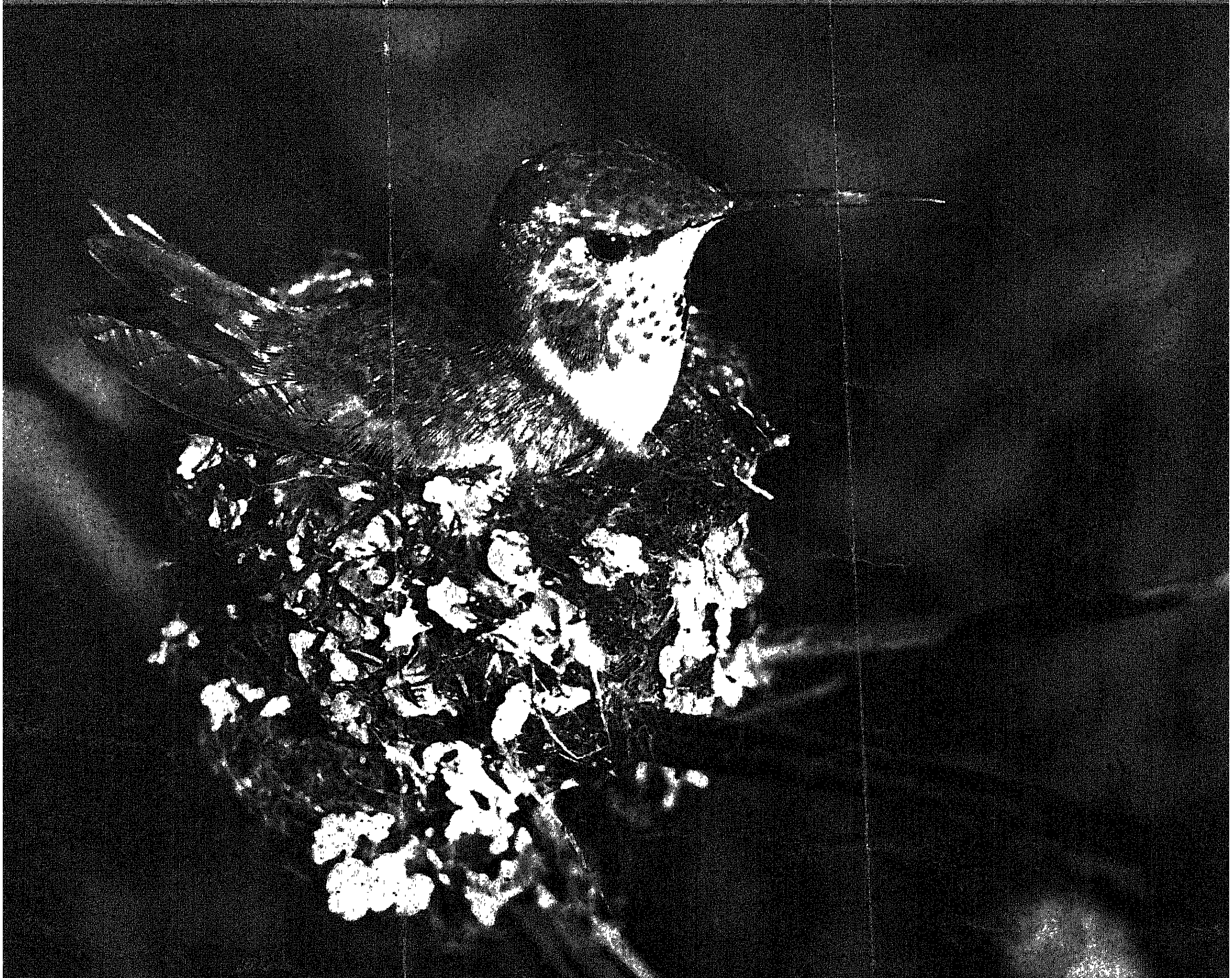
CIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • SEPTEMBER 22, 1945



Precarious Position

See Page 183

A SCIENCE SERVICE PUBLICATION

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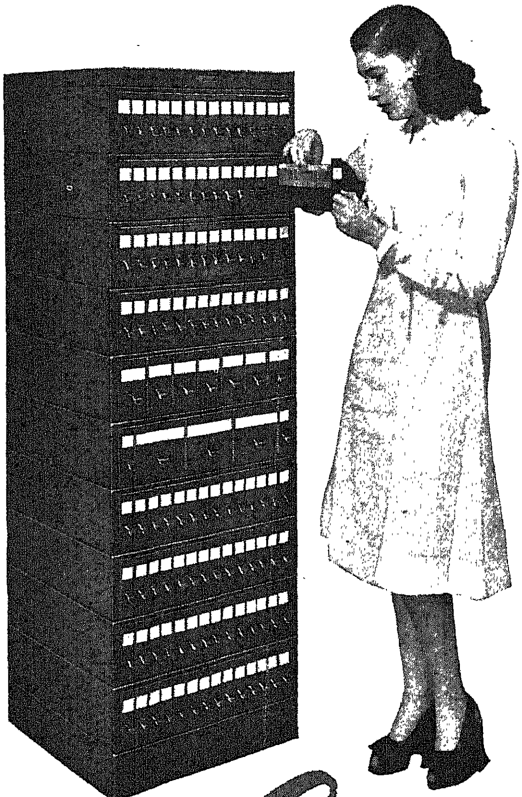

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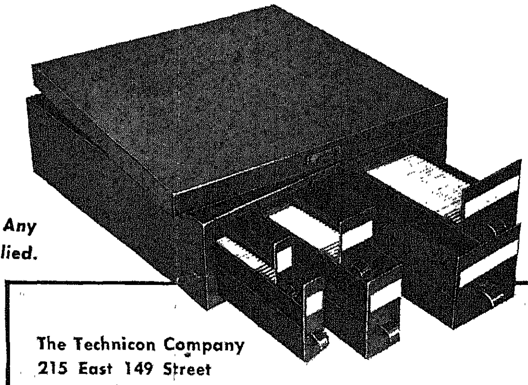

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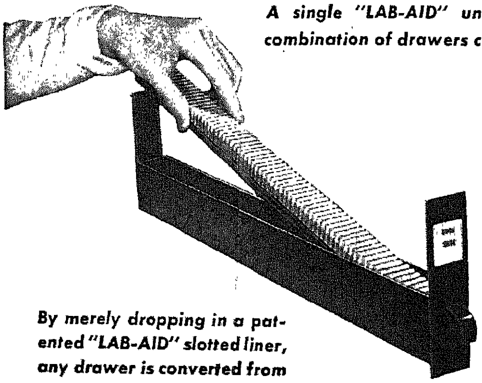

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NUTRITION

PW's Recover Quickly

Rapid recuperation from starvation of Americans liberated from Jap prison camps gives good prognosis for people in disturbed areas abroad.

➤ THE MEN, women and children in European and other disturbed areas who have suffered starvation or near starvation during the war will have a better chance for good recovery than has generally been expected, nutrition experts serving as consultants to the Army Medical Corps believe.

The speed with which Americans liberated from Japanese prison camps have recovered from starvation is the basis for this belief.

Civilians captured in the Philippines were examined during the 72 hours between their return to West Coast ports and their departure for their homes throughout the country. Results of the examinations were reported to Maj. Gen. Norman T. Kirk, Surgeon General of the Army, by the consultants, Dr. Allan M. Butler, of Massachusetts General Hospital, Dr. Julian M. Ruffin, of Duke University School of Medicine, and Miss Marion M. Sniffen and Miss Mary E. Nickson, of the American Red Cross in San Francisco.

Re-conquest of the Philippines came just in time for the American civilian prisoners of war, the report indicates. Those at Santo Tomas, Los Banos and Bilibid internment camps were then "slipping over into the borderline state of extreme starvation."

Late in 1944, the American administrative committee of the camp at Santo Tomas reported that "more than 50% of the camp had clinical signs of starvation."

On their return to America, shortly after their liberation, 78% of the internees reported that they felt "fine" except for getting tired easily.

The most common complaint still existing in the Americans, the nutrition consultants report, is neuritis of the hands and feet.

The biggest complaint they had immediately on reaching America was digestive upset suffered on their way back as they began to eat "something approaching a normal American diet."

These digestive upsets that came with the shift from the inadequate diet to highly concentrated food like the Army K ration give a tip to persons responsible in future for feeding liberated prisoners or starving populations. A special emergency diet should be used, the nutrition consultants advise. Skim milk and other suitable proteins, plus vitamins, should be given first, instead of carbohydrate foods like white flour and sugar.

Of the eight children born in captivity, only three showed the effects of malnutrition. Rickets was not as prevalent as it might have been from diet standards alone because the mild climate and sunlight in the Philippines made it possible for these babies to synthesize their own vitamin D.

The rapidity of recovery of the adults and the relatively good condition of the children show how quickly the human body will return to normal, the nutrition consultants stated.

"This recovery justifies a prognosis for individuals throughout disturbed areas of the world which is better than generally appreciated," they report.

"Continually, while the information submitted here was being obtained," the report concludes, "evidence of a chivalry of men to women and of men and women to the sick and young was revealed which should be recorded in honor of these individuals and as a tribute to the society whose code they adhered to under such trying circumstances."

Science News Letter, September 22, 1945

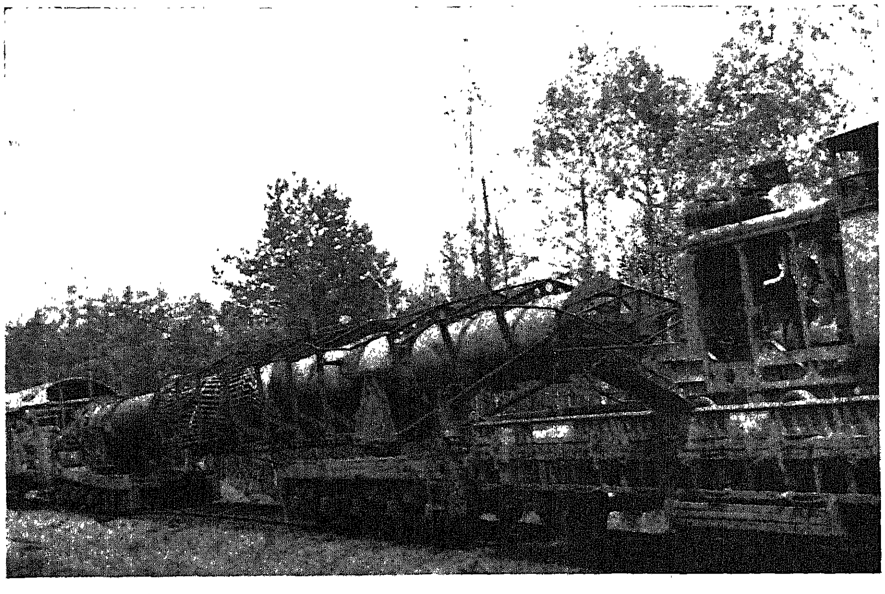
ENGINEERING

Telephone Installations Will Soon Begin

➤ TELEPHONE installations in private homes and in offices will follow closely the manufacture of new telephone instruments, switchboards for central offices and telephone exchange cable, it is announced by Western Electric Company, Inc., which manufactures most of the materials and equipment used by the Bell Telephone companies. Some of the manufacturing plants are already working on a seven-day week; others will, as soon as conversion from war manufacturing is completed.

The making of telephone instruments for civilian installations was actually re-established in the late summer of 1944, after war needs were met. Over 400,000 instruments have been made since last fall and production is now going on at the rate of 25,000 a week. But even with this production, many subscriber applications cannot be filled immediately because of a shortage of switchboards and cable.

Science News Letter, September 22, 1945



BIG GUN! The undamaged tube of the gun found by Col. F. B. Porter in Bavaria was 105 feet long. (See page 180)

ORDNANCE

Biggest Gun Made

Found by American officer in Bavarian forest, the world's biggest gun fired shells weighing eight tons to an extreme range of nearly 30 miles.

➤ ONE SPECIMEN of the heaviest ordnance ever built, a monster weighing 1,344 tons that threw 31.5-inch shells weighing more than eight tons each to an extreme range of nearly 30 miles, has been found on an abandoned railroad track in Bavaria by an American field artillery officer, Col. F. B. Porter.

Reporting his discovery to the *Field Artillery Journal* (Sept.), Col. Porter states:

"Recently while on a mission which took me along a little-used road between the towns of Auerbach and Eshenbaum in Bavaria, I came to a small dirt road which led through the forest to a village called Metzendorf. There I met an American soldier who said that there were some big guns back in the woods. Being interested in weapons I followed the indicated route for about half a mile.

"On approaching a single-track railroad I saw a gun tube so huge that I stopped and gasped for breath. Upon further inspection I found the remnants of 14 railroad cars, intermingled along the track with special cars carrying two huge gun tubes, one cradle and carriage for these tubes, and the parts and accessories for one gun and carriage.

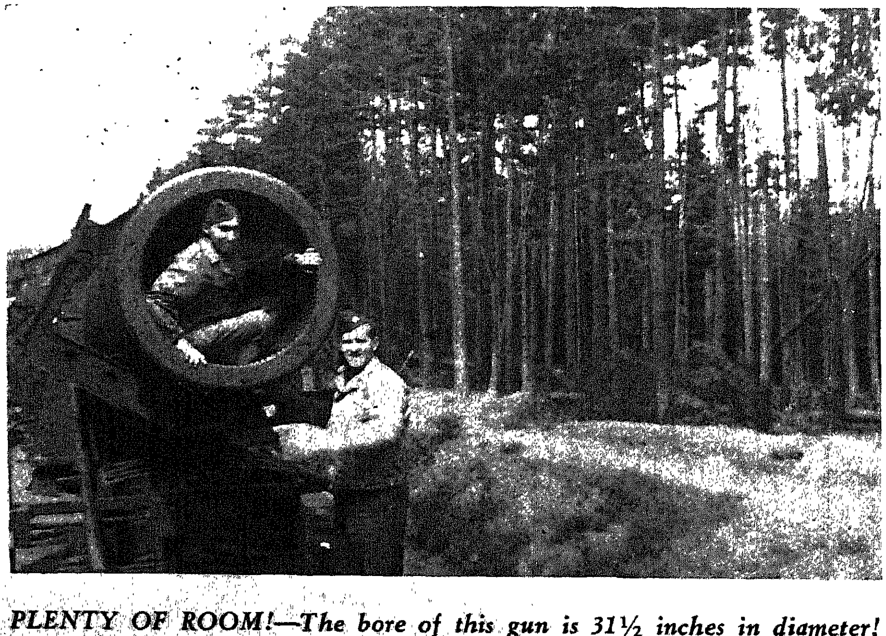
"Before abandoning them the Germans had performed as much demolition as was possible. One huge tube was intact, however, and the carriage, though badly damaged, can probably be repaired. The necessary parts of other weapons (if such still exist) could be used, making one weapon available for study."

The huge weapon was built by the Krupp works, and was originally intended for use against the Maginot line. Breakthrough at the "soft" end of that line at Sedan and the subsequent collapse of French resistance robbed it of that job. However, it was later used against the Russians at the siege of Sevastopol, where its enormous shells, rivalling in weight the biggest bombs carried later by Allied planes, were received with mingled dismay and incredulity. Guns of this type may also have taken part in the cross-Channel bombardment of Dover. It had been given a name: Gustav Geschuetz, which may be loosely translated as "Gus the Goon."

Although the gun was a giant, it was no freak, like the nine-inch weapon used in the ultra-long-range bombardment of Paris in the spring of 1918. Length of the tube, as paced off by Col. Porter, was 35 yards. Length of the rifled portion was only 36 times the diameter of its bore, which really makes it relatively short-barreled, as artillery pieces go.

Because of its enormous weight, and the necessity of moving it in several separate pieces, it required about three weeks after arrival at the firing point to set it up. Speed of the American sweep through southern Germany in the last days of the war, driving off the German cannoneers before they could complete demolition of the piece, may be thanked for saving at least one specimen for ordnance men to study.

Science News Letter, September 22, 1945



PLENTY OF ROOM!—The bore of this gun is 31½ inches in diameter!

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PUBLIC HEALTH

Cuts Down Diseases

Disinfection of schoolroom air by ultraviolet light helps check infectious germs. This can be a substitute for air replacement.

➤ THE EVER-difficult problem of hygienic schoolroom ventilation may be solved by ultraviolet light, it appears from a report of Dr. Mildred Weeks Wells, of the University of Pennsylvania School of Medicine, in the *Journal of the American Medical Association,* (Sept. 15).

"School ventilation, which has necessarily been curtailed on account of fuel shortages during the war, will probably never return to prewar standards," she declares. "Enlightened opinion, which formerly opposed, on hygienic grounds, lowering the volume of air change, now recognizes the potentiality of higher standards of sanitary ventilation through air disinfection, which can practically provide the hygienic equivalent of ventilation impossible of attainment by actual air replacement".

The school ventilation standard of 30 cubic feet of air per minute per child is not only difficult to attain; it is not enough to prevent classroom spread of chickenpox and measles except in rooms where less than 40% of the pupils are susceptible to chickenpox and less than 20% are susceptible to measles.

In contrast to this, Dr. Wells found the chances of a susceptible child getting measles, chickenpox or mumps from a classmate can be definitely reduced by disinfecting schoolroom air with ultraviolet light.

Her conclusions are based on studies begun in the Germantown, Pa., Friends School in 1937 and subsequently expanded so that since the fall of 1941 they have included two neighboring private schools and two groups of public schools in Philadelphia suburbs.

Even better results may be attained with air disinfection as the result of the early experience with it. Proper servicing of the lamps is important. Teachers and pupils should understand how they work so as to avoid the mistake made in one school of draping the lights with autumn leaves and Spanish moss for the Thanksgiving festivities. This, of course, blocks the ultraviolet rays so they cannot get at the germs in the air to kill them.

In a first grade outbreak of measles, nine little girls being infected from a classmate, the cause was apparently the fact that a playhouse was put into the schoolroom. This reproduced in miniature the exact situation the lights were designed to prevent. It gave a chance for germ-laden droplets of moisture from one little girl's breath to reach all the others without having been exposed to the germ-killing light.

When the air has a high relative humidity, as it may in fall before the heat is on, the ultraviolet light is less effective in killing germs. This difficulty may be unavoidable.

Science News Letter, September 22, 1945

MILITARY SCIENCE

Radioman Tells Iwo Jima Experience

A letter to the Editor from James F. Ward RM 2/c, who took part in the Iwo Jima invasion.

➤ WE ALWAYS get our magazines and newspapers rather late out here, but in your March 31 issue we paid particular notice to the front cover. Our particular type of ship is not well known and little is said about them so we are always on the lookout for anything new concerning them that comes out in any of the magazines we get on the ship.

There were twelve LCS's that took part in the Iwo invasion and the cover of your magazine is without a doubt a reproduction of a photo of our group of LCS's coming away from Suribachi after a rocket run. The ship showing up best, lightest in color and directly in the center of the picture, we are sure is the "54," our ship.

For obvious reasons we would like some reproductions of the picture. If possible photos as large as the cover. What is sent will be left up to you of course.

Iwo was for most of us our first taste of action. We saw plenty of it there, too. Our gang made two rocket runs at the beach near the base of the famous mountain. One 90 minutes before the initial assault. We then led the actual landing in, covering the marines with our guns and also giving the Japs more hell with another load of rockets.

After escorting the "Bellhops" in, we lay a few hundred yards off shore and peppered targets such as mortar implacements and machine gun nests, which were plenty thick on Suribachi. Clear through to March that was our job around the island fortress. Not all of the mortar fire was directed at the Marines either.

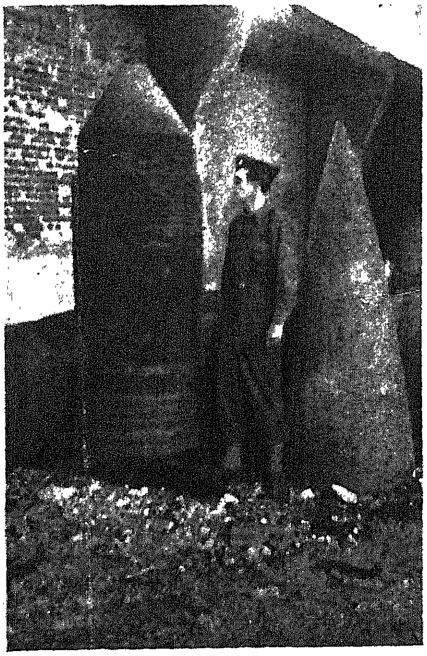
Our little bunch also went right on to Okinawa after a short rest. Ninety-six days were spent there battling the Jap Kamikaze boys. Three of them took dives other than suicide after our guns spoke. All told, our group destroyed almost 50 Jap planes in that campaign.

I could go on for quite some time telling you about our action but this is supposed to be a business letter. In case you would like to know more about the LCS's (called "Mighty Midgets" by Admiral Turner) I can give you some more information on my own and from other sources.

For your information LCS stands for Landing Craft Support. The Navy tagged it LCS (L) (3). The (L) meaning large. The (3) meaning third modification.

I am a Radioman and am writing this letter for the eight men, including myself, in the radio gang. Each of us would very much appreciate a photo.

Science News Letter, September 22, 1945



COMPARISON—The man appears dwarfed beside the huge projectile. The weight of the projectile plus windshield is eight tons; over-all length is 13 feet.

METALLURGY

Iron Ore for 100 Years

Prediction of exhaustion by 1950 is unwarranted as the great Mesabi range in Minnesota may produce on a large scale for over a century.

➤ THE GREAT Mesabi range in Minnesota, barring some now unforeseen development, will be producing iron ore from open-cut operations on a large scale for at least 100 years, predicts Dr. A. B. Parsons in *Mining and Metallurgy,* (Sept.), published by the American Institute of Mining and Metallurgical Engineers. He refers to a report that the known reserves of the Lake Superior district will be exhausted in 1950 if mined at war production rates as misleading.

This report was made in 1942 by E. W. Davis, of the Minnesota Mines Experiment Station, to the War Production Board. These Minnesota mines produced about 85% of the ore that provided the United States with steel for fighting the war. The record shipment from the area was 91,542,000 long tons in 1942; the 1944 shipment was less than 80,000,000 tons, sufficient to meet the needs.

The report by Mr. Davis was based on an annual shipment of 100,000,000 long tons, and dealt only with proved reserves of ore of "merchantable," or direct-shipping grades containing 51.5% iron. Dr. Parsons' study is based largely on figures in the Davis and other reports.

Now that the war is over, Dr. Parsons estimates that average annual shipments will shrink to about 50,000,000 tons a year, because New York State, Alabama and the Far West may in the future contribute more to the total than before the war. The "proved reserves" in Minnesota are much lower than the actual reserves, he feels, because "as soon as it is proved by drilling, first-class ore in Minnesota becomes subject to an ad valorem tax that amounts to about 2 1/3 cents per ton per annum."

This tax, he states, is one good reason for not developing ore too far in advance of the time it is expected to mine it.

As a further source of vast iron ore supplies, Dr. Parsons indicates the possibilities of beneficiating, or treating, ores containing from 35% to 40% iron and from 20% to 40% silica. Since 1930, he says, "about 20% of the ore sent down the Lakes was a product brought up to shipping grade by beneficiating this intermediate material — intermediate between the well-leached direct-shipping ore and the unleached iron-bearing taconite."

These taconites, he declares, particularly those in which the iron oxide is mostly in the form of magnetite, might supply 10,000,000,000 long tons of high-grade concentrates.

Science News Letter, September 22, 1945

MEDICINE

Blood Substitute Used

The Germans used a chemical, Periston, instead of plasma for treatment of shock in their wounded. Is not acceptable by American standards.

➤THE GERMANS used very little blood plasma for treatment of shock in their war wounded. Apparently they never got around to setting up donor centers such as the American Red Cross organized early in the war.

Instead of plasma, the Germans used a synthetic chemical called Periston. American scientists turned thumbs down on it when they studied it. It is a polymer, polyvinyl pyrrolidone, made in the course of developing new plastics. This and related polymers in some ways physically resemble albumin which is probably what led to development of one of them as a blood substitute.

Periston is one of the war developments of the German chemical industry reported by the industrial intelligence staff of the Chemical Warfare Service. Some of it, however, had been obtained from Germany at least two years ago and studied by scientists on the blood substitutes committee of the National Research Council. Although the Germans are reported to have used over 300,000 units of Periston for military personnel, apparently without harmful effects, the blood substitutes committee was of the opinion that it was probably more harmful than materials American medical scientists would accept for a blood substitute. They also found that it was not sufficiently effective to be recommended for use by American physicians and surgeons.

Penicillin was another aid to American wounded which the Germans apparently did not have. They relied mainly on the sulfa drugs for fighting infection in wounds. One of these, Marfanil, was used so widely that apparently they failed to develop a satisfactory production method for penicillin.

A new sulfa drug, Globucid, developed by Schering, was produced in quantity because of its lower cost compared to sulfadiazine. Two other germ fighters, 3065 and 3214, were still under study when the war ended. These were dibromo and tetrachloro compounds of Salicil.

The Germans produced large quantities of atabrine for malaria and investigated other antimalarial drugs, among them a quinoline derivative called Sontochin. Some showed promise but apparently nothing better than atabrine was developed.

When imports of opium were cut off, lower-yielding domestic poppies were used as a source of this important pain-relieving drug.

Hormones and vitamins, both synthetic and natural, were apparently in large demand and production in Germany, the report states. In a number of instances, technical improvements were made in their method of manufacture. The Germans tried to synthesize vitamin A but failed.

German drug manufacturers gave meticulous care to purification of the final products and to the forms of the end products. They used equipment similar in type to that used elsewhere but carried on their operations on a smaller scale than American drug manufacturers. Kettles, tanks and stills, for example, were usually of only one- or two-quart capacity, except in the cases of drugs produced in large volumes such as the salicylates. Even the sulfa drugs were made in equipment of only moderate size.

Science News Letter, September 22, 1945

Nitroglycerin is now 99 years old; it was in 1846 that an Italian scientist found that combining nitrogen, oxygen and glycerin produces a highly explosive substance.

ORNITHOLOGY

Nests With Awnings

The Allen hummingbird lays its eggs when the nest is a mere platform and they might easily roll out. All the work is done by the female.

See Front Cover

➤ THE ALLEN hummingbird, native to California, continues to build its nest until the young birds leave, states Dr. Elmer C. Aldrich of the Museum of Vertebrate Zoology in Berkeley, Calif. Some females lay eggs when the nest is a mere platform and the eggs could easily roll out, Dr. Aldrich reports in *Condor*.

The nest is built, the eggs hatched and the young reared solely by the female. The "unemployed" males may form bachelor societies around choice feeding areas. The female bird on the cover of this SCIENCE NEWS LETTER is shown in normal incubation position.

Awnings in the form of a branch a foot or so above the nest seem to be considered desirable to shade and protect the eggs. Nesting sites usually are chosen because they provide many separate supports for the first materials that are to be laid down. Nests are placed from one to 50 feet above the ground. Dense tangles are favorite sites.

Eucalyptus and cypress trees, oaks and shrubs and vines of streamside thickets provide suitable places for the nests, Dr. Aldrich says. Rather than build on a solid support, the Allen hummingbird tends to build where part of the supporting structure can be incorporated into the sides of the nest.

In eucalyptus trees the nest is built far out on an overhanging branch where the limbs are less than one inch in diameter. Sometimes the nest is saddled between two fruits or on the slender stems of leaves. Occasionally it is placed on a horizontal leaf attached to a vertical stem. Sometimes, instead of choosing one of these swaying locations, the bird places her nest between pieces of loose bark on the main trunk of the tree.

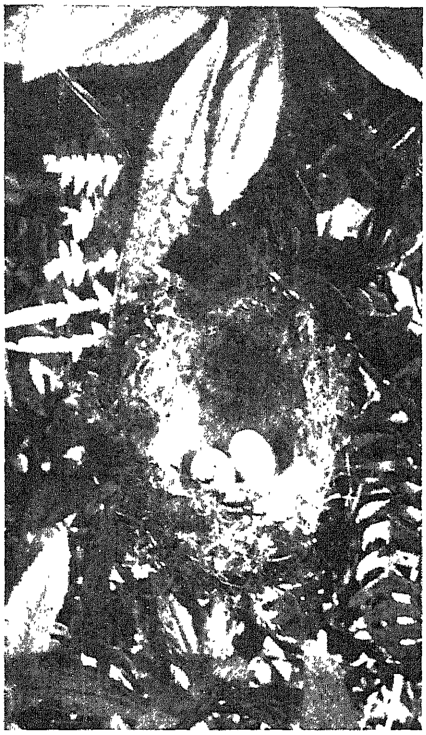
Spiderwebs are essential in building a nest, as they are used to hold the layers as well as the whole nest in place. The webs are gathered from trees, faces of rocks, out of the air, or any place the bird can find them. Webs usually are taken while the hummingbird is on the wing and hovering, reports Dr. Aldrich. They are grasped between the tips of the bill and the fibers are tangled irregularly over all of the bill and sometimes on the forehead and throat. Quick backward movements pull the webs from their moorings.

Down from willow seed is used to line the nest. In gathering the down, the bird makes intermittent stabs and short, backward flights until it has a loose ball about half an inch in diameter in its bill. Feathers, shredded leaves, grass fibers and hair are also used in the nests. Ninety percent of the material is obtained within 25 yards of the nest.

In about nine-tenths of the nests studied by Dr. Aldrich, moss made up the largest part of the outer layer, thus giving the outside of the nest its characteristic greenish color. The nests were invariably decorated on the outside with lichens. Rains tend to keep the mosses and lichens green and fresh.

Practically always two eggs are laid in each nest, being laid on alternate rather than on successive days. The eggs are pure, glossless white. Incubation begins with the laying of the first egg and lasts from 17 to 22 days. The bird sets with her back toward the source of light.

Science News Letter, September 22, 1945



INSECURE—The nest is precariously attached to curled tips of bracken fern. A heavy rain caused the nest to stretch. Later both young fell out.

ELECTRONICS

Better Fluorescent Lamps From New Technique

➤ BETTER and brighter fluorescent lamps will come from a relatively new electronic method of applying to the inner walls of their tubes the essential phosphor coatings that transform the invisible ultraviolet rays emitted inside the tubes into visible light. The new process also simplifies and speeds production, improves the color of the light, and increases the emission efficiency by about 4%.

The new technique was developed by Daniel S. Gustin in the lamp division of Westinghouse Electric Corporation. In reality, it is an electrostatic precipitation onto the inside wall of a tube of the tiny particles of the phosphor from a phosphor "smoke" put in the tube. The method is controllable, produces a uniform coating neither too thin nor too thick. Drying or high-temperature baking is not required, and the coating, when once applied, sticks.

To form the "smoke," Mr. Gustin ground the phosphor finer than talcum powder, inserted the pulverized material in a proper container and passed a jet of air through it. A little of this dusty air is put into the tube to be coated. Then a rounded, pencil-thick rod with a sharpened tip is pulled through the tube. This rod serves as an electrode, introducing into the tube the high voltage necessary to pluck the phosphor particles out of the smoke and precipitate them on the wall of the tube.

When the rod is drawn along the tube interior, the powder particles rushing into its sharpened point become electrically charged with a positive charge. Immediately they are pulled away by electric attraction of the negatively-charged, electrically-conducting heated wall of the tube. The force of the impact causes the particles to adhere to the glass. There they take on an insulating property leaving only clear glass to attract more powder. This gives the even distribution.

Science News Letter, September 22, 1945

The fixation in soils of *nitrogen* from the air depends upon the presence of liberal amounts of organic residues in the earth as a source of bacterial energy.

CHEMISTRY

Fine Hard Wallboard Made from Sawdust

➤ HOW SAWDUST and other wood waste can be made into a fine quality hard wallboard by a new chemical process and a hydraulic press was demonstrated recently to a group of scientists at the Polytechnic Institute in Brooklyn, where the new method was developed. The simple chemicals used are themselves waste by-product of wood-using industries.

The new process is so simple and the equipment costs so low, that every sawmill in the country producing a few tons of sawdust a day will find it a profitable project. The sawdust passes directly from the saw to a mixer where the chemical is added. A minute or two is all that is required for the mixing. Then the pulp is squeezed in a hydraulic press. The catalytic action of these wood-derived chemicals causes the wood to recombine with itself into a strong, grainless board.

By use of molds, the pulp can be pressed like a plastic into any special shape required, such as into complete doors, panels or molding. It has been compressed into cups, plates, trays, and probably can be shaped into one-piece dories and duck boats.

With the new process, it is claimed, 2,000 square feet of first quality, strong, water-resistant wallboard can be obtained from one ton of sawdust. It is estimated that 20,000,000 tons of sawdust and related fine shavings and chips result from all phases of production by the lumber-using industries of America each year. In addition to annual sawdust production, vast quantities of old sawdust may be found in lumber areas. With the partial depletion of timber supplies due to excessive war needs, wallboards made from waste sawdust might prove particularly desirable during the expected building boom of the next few years.

Science News Letter, September 22, 1945

GENERAL SCIENCE

Science Research Center Under Construction

➤ A NEW industrial science research center under construction in Bound Brook, N. J., is another bit of evidence of appreciation by American industrialists of the part science played in winning the war, and the increasingly important part scientists will play in American manufacturing. The building under construction is the first unit of a gigantic center to carry on research work in the field of building materials. It is being erected by the Johns-Manville Corporation.

A unique feature of the first building of the group planned, a $2,000,000 structure, is that it will contain central laboratories and 10 experimental factories. Projects initiated in the laboratories may thus be carried through their development and pilot-plant production stages under one roof. This is expected to speed up the development of new and improved materials for building and for industrial uses.

The completed research center, if constructed according to present plans, will include six buildings on a 93-acre plot, across the Raritan river from the company's plant at Manville. They include two laboratory-factory structures, a research engineering and machine shop building, a water filtration and waste processing building, and utility buildings.

Science News Letter, September 22, 1945

ELECTRONICS

Hydrogen in Furnace Continuosty Indicated

➤ THE HYDROGEN content in copper wire annealing furnaces, an element whose presence is detrimental to the process, is now continuously indicated by a new sensitive apparatus called a sniffer nose. It also detects the presence of other detrimental gases, such as oxygen and carbon monoxide, because they are usually present in quantities proportionate to the hydrogen content.

The new apparatus is a development of General Electric laboratories. It is extremely simple in design and operation, and can be used with any of the ordinary annealing furnaces now in use in wire manufacturing plants. By means of it an accurate and precise indication of annealing furnace conditions can be maintained, it is claimed, and information is provided which formerly could be obtained only by lengthy chemical analysis.

Bright annealing of copper for wire applications must take place under extremely well-regulated furnace conditions, in what engineers called a neutral or reducing atmosphere. It must contain very little hydrogen, since this gas tends to make the wire brittle. The presence of oxygen causes oxidation and the formation of the green material that can often be seen on copper roofs. The presence of carbon monoxide causes the loss of certain valuable properties of the wire.

Science News Letter, September 22, 1945

IN SCIEN

ASTRONOMY

Autumn Officially Begins on Sept. 23

➤AUTUMN officially begins this year on Sunday, Sept. 23, at 5:50 a.m., E. W. T., when the sun's center will be directly over the equator of the earth, according to calculations made at the Nautical Almanac Office of the U. S. Naval Observatory in Washington, D. C.

At this time of the year the sun rises directly east and sets directly west. Hence, supposedly it is above the horizon for half of the 24 hours and below for the other half, making the days and nights exactly equal in length. The name "equinox," in fact, means "equal night." This is not quite true, however, as the sun's light is bent as it comes through the atmosphere, and we can actually see the sun while it is slightly below the horizon.

Science News Letter, September 22, 1945

MEDICINE

Cashew Nut Shell Oil Found Poisonous to Some

➤ PERSONS who are sensitive to poison ipy become industrial risks when they work with the oily liquid extracted from cashew nut shells, which is now used in the preparation of certain resins and plastics employed in brake linings and insulating materials. A study of the ill effects of this liquid is reported in *Science* (Sept. 14), by Dr. Harry Keil, of the New York Post-Graduate Medical School and Hospital, and Dr. David Wasserman and Dr. Charles R. Dawson of Columbia University.

The cashew nut tree and poison ivy are fairly close botanical relatives, though their native habitats are half a world apart. The active principles that make them a menace to sensitive skins are chemically related; both belong to the phenolic group of compounds.

The three investigators also call attention to the fact that men in our armed forces who are sensitive to poison ivy have reacted to the foliage of the cashew nut tree when they came into contact with it in the Southwest Pacific region. Sometimes the effects were disablingly severe, as they occasionally are with poison ivy.

Science News Letter, September 22, 1945

E FIELDS

CHEMISTRY

Many New Types Of Synthetic Rubber

➤ NOW THAT the war is over, and with it the necessity for "freezing" onto one formula for maximum production of synthetic rubber, it can be expected that rubber chemists will strike out along new lines in efforts to produce synthetics that will equal or better the performance of natural rubber—which the war-time GR-S rubber quite definitely did not, lifesaver though it was in time of need.

In keeping with this expectation, two research chemists of the B. F. Goodrich Company at Akron, Dr. Waldo L. Semon and Dr. Charles F. Fryling, have received a number of U. S. patents on new synthetic rubbers. Although many possible compounds are listed, they all call for butadiene or one of its close chemical relatives as a principal ingredient. Instead of the styrene which forms the other half of the present standard GR-S rubber, these new synthetics call for acrylonitrile and one other ingredient, which may be selected from a considerable list, but usually belongs to the group known as the alkyl acrylates.

Among the advantages claimed for the new synthetics are high plasticity and easy workability in the unvulcanized state, with great strength and elasticity after vulcanization. They are said to be especially good at low temperatures, such as are encountered by aircraft at high altitudes.

Each of the two chemists received five patents; Dr. Semon's are numbered 2,384,568 to 2,384,572, and Dr. Fryling's from 2,384,543 to 2,384,547. Rights in all are assigned to the B. F. Goodrich Company.

Science News Letter, September 22, 1945

GENERAL SCIENCE

National Research Council Offers Fellowships

➤ YOUNG SCIENTISTS who have had their graduate work interrupted by war duty and are now ready to resume their studies are invited by the National Research Council to apply for grants from a special $335,000 fellowship fund provided by the Rockefeller Foundation. Unlike fellowships previously administered by the Council, which were given only to persons who had already obtained the Ph.D. degree, these new fellowships are for men and women who have their bachelor's degree but have not yet completed the additional three or four years of work required for the doctorate.

These predoctoral fellowships are intended specifically to help in "the recovery of the scientific vigor and competence of the country which is so seriously threatened by the loss of almost two graduate school generations of scientifically trained men and women."

The annual stipend will be $1200 for single persons and $1800 for married men. In general it is expected that each recipient will spend at least eleven months per year on academic work. An additional allowance up to $500 per year will be made for tuition fees. Fellowships granted to individuals who are eligible for educational support from the "G.I Bill of Rights" will be at such stipends as to bring the total income from these two sources to that which would be received at the above rates. Prospective applicants are urged to write to the National Research Council at once, even though they may not be able to undertake their graduate work until later.

Information about the NRC predoctoral fellowships, together with applications blanks, are being mailed to graduate schools throughout the country, as well as to wartime research laboratories. Prospective graduate students may obtain information from these places, or by writing directly to the Secretary, Committee on Predoctoral Fellowships, National Research Council, Washington 25, D. C.

Science News Letter, September 22, 1945

METALLURGY

Method for Recovery Of Indium from Zinc

➤ INDIUM, a scarce metal related to aluminum, used in small quantities as an alloy in dental work and as a plating material, is recovered from zinc, in which it occurs as an impurity, by a chemical method on which patent 2,384,610 was granted to H. M. Doran, M. A. Jackson and A. I. Alf, all of Great Falls, Mont. Essential steps are solution in sulfuric acid, with subsequent electrolytic recovery of the zinc, and precipitation of the indium in the form of a bisulfite. The latter salt is further treated to free it from iron, aluminum and other impurities, then redissolved in an acid and subjected to electrolysis to get out the pure metallic indium.

Science News Letter, September 22, 1945

PHYSICS—GEOGRAPHY

Site of Atomic Bomb Test To Be National Monument

➤ THE ATOMIC bomb explosion site in New Mexico and surrounding area is to be recommended as a national monument, the Secretary of the Interior has decreed. In a way, the monument will be dedicated to science and to the scientists of America, Great Britain and other countries who pooled their knowledge and skills in producing the development that delivered the final stroke that hastened the Japanese surrender.

The site of the first non-laboratory test of an atomic bomb, where its destructive potency was proved, is on what is known as Alamogorda, N. M., bombing range. It is within a federal grazing district and was withdrawn for the use of the Army in 1942.

The Interior Department's recommendation that this area be made a national park must go to the President for consideration and action. Already the Commissioner of the General Land Office has received instructions to reserve the land for creation of the monument, and the National Park Service, under whose administration national monuments rest, has been ordered to make the necessary surveys as soon as the Army permits.

Science News Letter, September 22, 1945

CHEMISTRY

Addition of Formaldehyde Improves Gramicidin

➤ GRAMICIDIN, one of the first of the germ-stopping antibiotics to be discovered, has never come into use for disease treatment because it is poisonous to animal tissues, and also destructive to red blood corpuscles. Addition of formaldehyde to gramicidin solutions renders it less harmful in these respects, while its ability to check the growth of bacteria remains unchanged, Dr. J. C. Lewis and a group of five colleagues report in *Science*, (*Sept.* 14).

Dr. Lewis and his research team carried on their work at the Western Regional Research Laboratory of the U. S. Department of Agriculture at Albany, Calif. They are continuing their investigations, and promise a fuller report at a future date.

Unlike penicillin, which is derived from a mold, gramicidin is produced by a soil-dwelling bacterium. It attacks germs belonging to a group against which penicillin is ineffective.

Science News Letter, September 22, 1945

GENERAL SCIENCE

Scientists of the Future

With the war over, youth is anxious to get on with its work of building a greater America and a more livable world through science.

By MARGARET PATTERSON
and FRANK THONE

➤ THE DEFEAT of Japan is attributed by Hirohito to the greater scientific achievements and resources of his enemies.

Exactly what the Mikado may have been thinking when he made this statement is of course his own secret, but it is fairly safe to conjecture that the poor little man's ears were still ringing from the atom-bomb thunderclaps in which two of his cities had instantly vanished, with the paralyzing fear that many others could be blasted in like manner at any moment.

He may also have had echoing about in his head other key-words of modern applied science, representing things that have contributed directly or indirectly toward the overwhelming technical superiority of the United States and other nations arrayed against him—words and symbols like radar, pentolite, high-octane, nylon, sulfa, penicillin, DDT.

All these things came out of the laboratories of the West, and found their way into use in planes, on warships, among the advancing ground troops, in hospitals where his enemies' wounded and sick recovered to return and fight again. It was truly a dismaying array of knowledge and skill to have to face, while his own universities and high schools had to be emptied into the armed forces, and even grade-school children were at last desperately drafted into the island empire's dwindling war industries.

Look at Our Record

Before we Americans accept this reluctant compliment too smugly, we had better take a good look at our own record. True enough, we have in the past few years wrought scientific miracles in war, and expect to go on working them in peace. But what have we paid? Are the brains that made these miracles possible still on the job? Will they be, for the no less exacting demands that peace will bring?

We have been warned lately, and from most responsible sources too, that in our eagerness to swell numbers in the armed forces we have been stripping our own laboratories and universities and even high schools of exactly the type of intellects and skills that has made our hard-won victory possible at all.

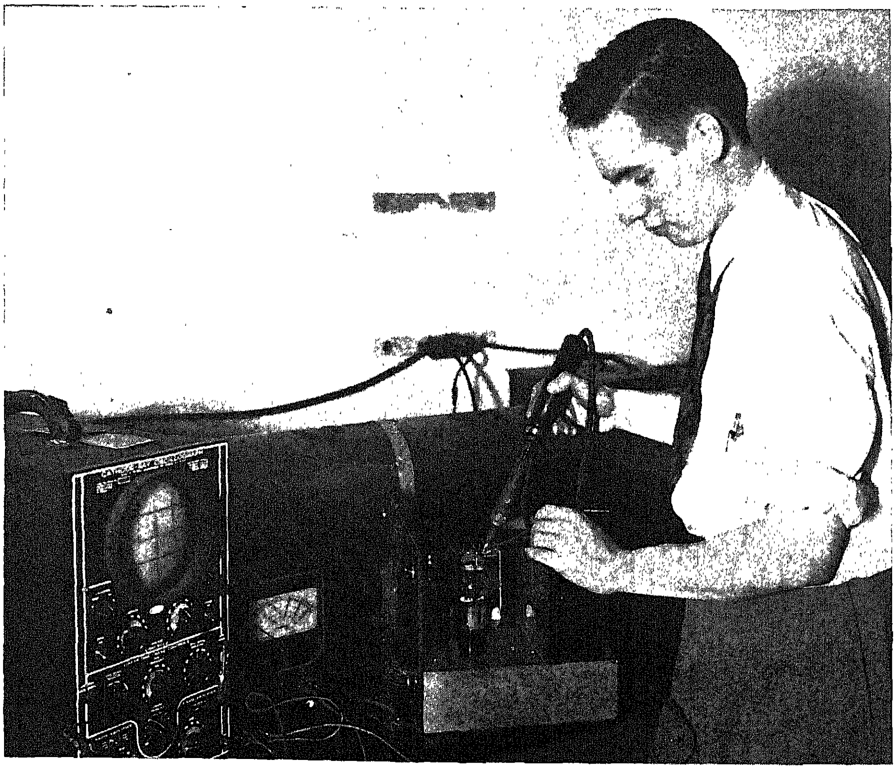
The now much-quoted report of Dr. Vannevar Bush, head of the Office of Scientific Research and Development, pointed out that because of the indiscriminate drafting of young scientists to serve in the ranks of infantrymen—and in barracks as KPs—we now have 150,000 fewer college graduates with degrees in the sciences than we normally should have, and a further deficit of 17,000 in the elite corps of research men—those who have piled another three or more years on the four-year college course and are ready to carry on independent investigations and to train others in their advanced fields.

These are dismaying deficits for the most powerful nation in a science-ruled world to face. Because they are so big they have a tendency to dull the mind to their real significance. So let's take a look at a smaller sample—one where individuals may be seen and counted.

During the past four years, the Annual Science Talent Search has been conducted by Science Clubs of America, among high school seniors all over the country, to select 40 exceptional boys and girls who will be brought to Washington, D. C., as finalists in competition for honors and substantial Westinghouse Science Scholarships. The fifth of these searches is now in progress and will end Dec. 27.

Of the total of 160 students who have thus far reached the finals in the four annual searches, 43 are girls. Since they are not subject to the draft and most of them are too young to be accepted for uniformed service women's organizations, they have gone on with their college courses.

Of the 117 boys, 59 have been called



SECRET PROJECT—Irving W. Rozian of the University of Michigan is shown working on the audio-oscillator which he assisted in building for a war-secret project for NDRC of OSRD.

CANCER STUDY—Virginia March, working at McArdle Memorial Laboratory for Cancer Research, University of Wisconsin, is shown giving a mouse its semi-weekly painting with hydrocarbons to induce tumors to aid in the study of cancer.

to the colors and thus have had their scientific training interrupted more or less seriously. Some of the other boys were under military age or were deferred for one reason or another.

Of the 59 called up for service, 33 were permitted to continue their medical, dental and engineering courses under Army and Navy training programs. Some of the others were sent to serve with the infantry and other Army and Navy combat outfits, where their scientific background was of little or no use. Others were rushed through short training courses and assigned to duty as specialists in communications, laboratory technicians and so on. Two were later invalided home. One of these, wounded in some of the toughest infantry fighting in Germany, received his discharge just before V-J Day and is now ready to resume his study of chemistry where he had to drop it a couple of years ago. Up to now, fortunately, none of the 59 young men in the fighting services has been reported killed.

However, some of them have been able to work along lines in which their special talents have been partially utilized in the war effort; and in a few instances their war experience has even opened up new outlooks or given new opportunities.

For instance, Cpl. Allan E. Voigt of Salem, Ore., set to work in an Army hospital, developed certain laboratory techniques useful in the study of malaria. He was also permitted to make a malaria survey of Germans in a prisoner-of-war camp. Lately he has switched his attention to the effect of penicillin on bacteria in myelitis cases. He is pointed straight for medical school at Northwestern University as soon as he gets his discharge.

Cpl. Barton Brown of Sea Cliff, N. Y., after a year of chemistry at Massachusetts Institute of Technology, was put to work on some hush-hush communications equipment at Mitchell Field. As a result of this experience he intends to return to that school with electronics as his major.

German Interpreter

Pfc. Robert L. Folger of Winter Haven, Fla., is getting a fine edge on his knowledge of German, which will continue to be an important language to scientists because of the immense amount of important research results published in Germany before the Nazis brought ruin to that country. He has been teaching a class of his fellow GI's, and is also chief interpreter for his battalion. But he is anxious to get back to his chemistry laboratory at the University of Illinois.

Students who were permitted to pursue their college courses undisturbed by calls to the armed service have not been out of the war picture altogether. Some of them, indeed, have been very much in it. Just a few examples:

John W. Michener of Pittsburgh, studying physics at the Carnegie Institute of Technology, has found time also to work on several secret OSRD projects in communications.

Richard Hinkle of San Francisco, student at the University of California, has served as a human guinea pig in high-altitude tests in the pressure chambers of the Donner Research Laboratory.

Rodman Jenkins, pointing for a career in chemical engineering at the Massachusetts Institute of Technology, has helped to make a new synthetic antimalarial drug similar to atabrine. Along with many other Science Talent Search winners there, he is a member of the M. I. T. Rocket Society.

The girl winners in the various contests haven't been living in ivory towers while the world was at war, either. First girl to take first honors, Marina Prajmovsky of Farmingdale, N. Y., has now received her bachelor's degree *magna cum laude,* with a Phi Beta Kappa to boot. She is taking a year out before she starts toward her Ph.D., to put in full-time work on a regular laboratory job at Harvard, investigating the physiological effects of DDT on nerves.

Evelyn Pease of Evansville, Ind., chemistry student at the University of Indiana, has spent her summer vacations working in a laboratory in her home town, helping in the synthesis of new

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Do You Know?

Fats, more than any other food, have the ability to satisfy hunger.

There are 2100 species in the *carrot* family.

Permanent *magnets* have been used as compass needles since 2,600 B. C., according to legend.

Citrus juices are America's favorite fruit drink, and account for about 80% of the canned fruit juices consumed.

India has large supplies of iron ore, manganese ore and coal, so is in a position to become a heavy producer of steel.

A new process in *magnesium casting,* in which stirring replaces superheating, has been developed in University of California laboratories.

An *underwater spotlight* for deep-sea diving operations packs 1,000 watts inside a bulb the size of an ordinary 40-watt type; if lighted where there is no cooling water pressure, it would fail in a few minutes.

sulfa drugs. For relaxation she takes flying lessons.

Two girls have taken over tasks set aside by male members of the Harvard College Observatory when they went into war work. The girl astronomers are Anne Hagopian, first-place winner in 1944, who is a student at Radcliffe, and Constance Sawyer, who commutes from Smith College for her nocturnal job in Cambridge. Photographic plates taken by these girls through the big Harvard telescope show the outburst of the latest nova, or exploding star, found in the constellation Aquila.

Patricia Dunkel of Rochester, N. Y., Wellesley student, got her summer suntan the hard way. She gained practical experience by taking an outdoor job on the farms of a seed company, where she did everything from transferring pollen to swinging a hoe.

Wartime college life has been real and earnest for these ambitious young scientists, but it hasn't been without its share of regular student fun. Nor have they been pale young intellectuals, either: football, basketball, wrestling, pulling an oar on the varsity and other strenuous forms of sport have split time with swimming, tennis and sailing. Two things that might set them slightly apart from the pre-war "College Joe" are a rather general interest in chess and a decided liking for the more serious type of music. A number of the young men and women are themselves musicians; the violin seems to be the most favored instrument.

Now that the war is over they are champing at the bit to get on with their real occupation, which is preparation for doing their part towards the building of a greater America and a more livable world through science. They take a decided interest, too, in plans for the first peacetime Science Talent Search, which will culminate in the early spring of 1946.

They are urging their younger schoolmates, now seniors in high school, to get into the contest. Science Service, in Washington, D. C., which administers the annual Science Talent Search, is already beginning to receive inquiries from interested teachers and school officials.

Science News Letter, September 22, 1945

CHEMISTRY

Chemical Industry Medal Awarded to Editor

➤ THE CHEMICAL Industry Medal for 1945 has been awarded to Sidney D. Kirkpatrick, editor of *Chemical and Metallurgical Engineering,* a McGraw-Hill publication, by the American Section of the Society of Chemical Industry. It is an annual award, made for contributions to the advancement of chemical engineering and research.

The presentation of the medal will be made in November. Selection of recipients is made each year by the society's executive committee.

Science News Letter, September 22, 1945

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BOTANY

NATURE RAMBLINGS

by Frank Thone

Useful Plants

➤ MOSSES, as a group, have almost no practical uses. This not very encouraging statement, in the introduction to a new book, *How to Know the Mosses,* might seem almost an invitation not to buy or read it. And that would be a pity indeed, for mosses have greater immediate interest, and greater ultimate usefulness, too, than such a deprecatory declaration admits on its face.

Mosses do have at least a few practical uses, the author, Dr. H. S. Conard, emeritus professor of botany at Grinnell College, concedes. Sphagnum is widely used as a moist packing material for live plants and small nursery stock in shipment, and on an even larger scale as a conditioner of heavy, humus-lacking soils. It is also used to some extent as an absorbent material in special-type surgical dressings. Some of the giant West Coast mosses serve as replacements for excelsior or shredded paper in packing crockery.

But the higher usefulness of mosses is what they accomplish just by being alive and having their places in the complex of the earth's vegetation. They aid materially in making this planet a fit place for men and beasts and bigger plants to live on. They and their kin-plants, the liverworts, colonize bare rock after it has been pioneered by the tougher and even lowlier plants, the lichens. They cover gashed scars in soil left by landslips, by erosion, by forest fires, and hold it until larger plants are ready to take over. They mantle the trunks of fallen trees in wet woods, and at least indirectly aid in their return to humus for the enrichment of the soil.

Not the least of the usefulness of mosses is the stimulus they give to the intellectual curiosity of human beings, and the esthetic satisfaction they yield upon more intimate acquaintance. If you can get yourself past the point where "all mosses look alike", you will find an infinite variety in form, and many most interesting mechanical adaptations to meet the problems of living.

Bringing out these points, and also giving some ideas of the beauties to be found in mosses, has been the task of the book's illustrator, Miss Louisa Sargent. Her 363 small, accurately made pen drawings are enough in themselves to convince the curious nibbler at the pages of what fascinating vistas in miniature he will open up if he will equip himself with a reasonably good hand lens and start peering at the stiff little evergreen leaves and the gnome-like, flowerless fruiting growths that he has until now never troubled to look at.

Science News Letter, September 22, 1945

BODYSCOPE

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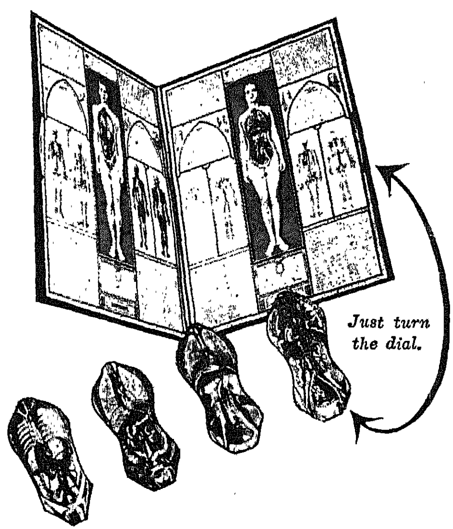

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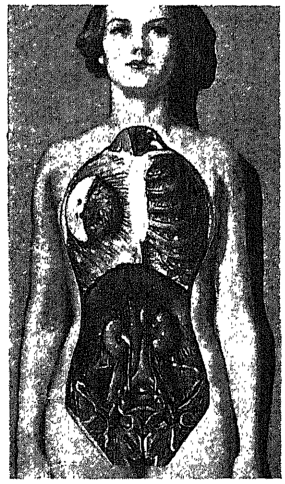

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PHYSICS

Youth's Responsibility

Taming of atomic power belongs to the young boys and girls, just as a generation ago they showed others the technicalities of radio.

➤ *THE TASK of taming atomic power belongs to youth. Just as, a generation ago, graybeards were turning to the high school boys of that day to learn the technicalities of radio, today the world must find among the coming generation the lads who understand the mysterious workings of atomic energies.*

Many of the boys and girls writing essays as part of their requirements for the Science Talent Search showed great eagerness to undertake atomic research. There is no reason to think that thirst for the subject was other than increased by the shield of silence imposed the last few years for public security.

The power that can be developed from the atom was a favorite essay topic for the first three years' contestants. Those who wrote on atomic power are now studying physics in college. A comprehensive resume of past research and predictions of future use is given in the following excerpts from essays by these winners:

➤ ALUMINUM was the first artificially radioactive element. A high-speed stream of alpha particles was directed at a target of this metal which, after the bombardment stopped, continued to emit neutrons and positrons. . . . William Hammerle, Athens, Ohio.

The nucleus of any atom is an apparent contradiction to electrical laws, for the protons, although of the same electrical charge, are tightly held together by some force that we do not yet understand. It has been known for some time that if we could destroy this bond, tremendous amounts of energy would be released. . . . Clifford Schwartz, Niagara Falls, N. Y.

Since the nucleus characterizes the entire element, its weight and the number of electrons involved in chemical reactions, as well as the radioactive properties of the element, most atomic research now concerns the nucleus. . . . Anne Hagopian, New York.

To convert an atom into energy, the strong electric bonds which tie the nucleus to the electrons must be broken. This may be done by using a high-speed particle to "shoot out" the nucleus. If the nucleus is only split, or captures the bombarding particle, an entirely different atom is the result. If the nucleus of the new atom is not stable, it will disintegrate, liberating energy. . . . Murray Gerstenhaber, Bronx, N. Y.

The nucleus splits into a few parts, the energy of the reaction being given off partly as gamma rays but mostly in the form of kinetic energy of the moving fragments—in other words, heat, since heat is molecular motion. Among the products are a few fast neutrons. If these neutrons are slowed up and returned to the uranium mass, the same process will repeat itself. . . . Victor Mayper, Jr.. Manlius, N. Y.

Once nuclear fission has occurred, a reaction which lasts 10-12 seconds, the two resulting particles which are themselves unstable disintegrate with the emission of neutrons. So it happens that a single neutron which possesses an energy of the order of five electron volts causes a fragmentation which produces fully 100,000,000 to 200,000,000 times more energy and at the same time leads to the production of more neutrons. These resulting neutrons, if slowed down, further the fission process and make it a self-propagating or chain reaction. . . . Murray Rosenblatt, New York.

In breaking up, the atoms take on great speed which is soon transformed to heat. It would require nearly 200,000,000 volts to duplicate this. Or, in comparison, coal is nearly 50,000,000 times feebler than U-235 in reaction. . . . Hillman Dickinson, Independence, Mo.

It is the opinion of many that this will be a long war. U-235 is a weapon which could end it quickly, but it must be our weapon, and we know that Nazi scientists are working on it too. . . . Beatrice Meirowitz, New York.

The study of atomic structure opens many opportunities for research to the chemist. Very interesting experiments with isotopes ought to be possible, particularly in the field of organic chemistry where isotopic carbon and hydrogen compounds and combinations of isotopic and normal forms may be prepared and analyzed. . . . Joan Kunkel, Garden City, N. Y.

Science News Letter, September 22, 1945

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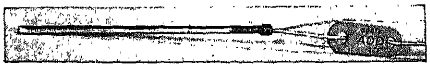

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Books of the Week

➤ THE WAR, a harsh schoolmaster, taught us thoroughly how much dependent we are on the southeastern corner of Asia for many necessities and comforts. We get these things only because men and women there work to produce them: the brown-skinned peoples we sweepingly lump as "Malayas". The highly varied patterns under this seemingly uniform brown surface have been a lifelong study of Prof. Fay-Cooper Cole of the University of Chicago; in his new book, THE PEOPLES OF MALAYSIA, he tells about them in easy, informal yet accurate fashion. (*Van Nostrand*, $4).

Science News Letter, September 22, 1945

➤ CLIMATOLOGY, especially in its comparative phases, has all of a sudden become a highly "practical" matter, its applications ranging all the way from choice of crop plants and livestock for the rehabilitation of war-wrecked countries to the siting and planning of new world-line airports. Valuable to the serious worker in this field is Wladyslaw Gorczynski's COMPARISON OF CLIMATE OF THE UNITED STATES AND EUROPE (*Polish Institute*, $5).

Science News Letter, September 22, 1945

➤ CHANGE, at a rate that will undoubtedly bewilder thousands of primitive minds, impends in many lands where change was hardly even a word in the native vocabulary before the war. What may happen and how it may come about, is outlined in THE DYNAMICS OF CULTURE CHANGE, written by the late Bronislaw Malinowski not long before his death in 1943. This should be a useful book for young men preparing for administrative tasks in far places and among strange folk. (*Yale Univ. Press*, $2.50).

Science News Letter, September 22, 1945

➤ ONE MAN'S struggle with the problem of soil wastage and its consequences in human deterioration, in Oklahoma, in the Philippines, in California, is vividly and earnestly told by Joseph A. Cocannouer in TRAMPLING OUT THE VINTAGE (*Univ. of Oklahoma Press*, $2.75). Hopeful portent for the nascent Philippine Commonwealth is the fact that his ideas were more hospitably received there than in Oklahoma.

Science News Letter, September 22, 1945

Just Off the Press

ADVANCES IN NUCLEAR AND THEORETICAL ORGANIC CHEMISTRY—R. E. Burk and Oliver Grummitt, eds.—*Interscience*, 165 p., illus., $3.50. Vol. III of FRONTIERS IN CHEMISTRY. A collection of lectures delivered at Western Reserve University.

THE CHEMICAL CONSTITUENTS OF PETROLEUM—A. N. Sachanen—*Reinhold*, 451 p., illus., $8.50.

THE GERMAN TALKS BACK—Heinrich Hauser—*Holt*, 215 p., $2.50. Introduction and footnotes by Hans J. Morgenthau.

HANDBOOK OF NONFERROUS METALLURGY: *Principles and Processes*—Donald M. Liddell, ed.—*McGraw*, 656 p., illus., $6.50. 2nd ed., revised.

HIGH-PRESSURE DIE CASTING: A Design Guide for Engineers—H. L. Harvill and Paul R. Jordan—*Harvill Manf. Co.*, 130 p., illus., $5.

HOW TO PRESERVE FOOD—Walter W. CHENOWETH—*Houghton*, 287 p., illus., $2.50. A scientific and practical textbook covering the whole field of home food preservation.

MACHINE TOOL GUIDE: Engineering Data Covering the Principal Machine Tools——Tom C. Plumridge and others—*Am. Tech. Soc.*, 773 p., illus., $7.50. Especially prepared for tool engineers, millwrights, and tool equipment salesmen.

MACHINERY OF STAINLESS STEELS—*Rustless Iron and Steel Corp.*, 83 p., paper, illus., free. Rustless library of stainless steel information No. 2.

OUR INNER CONFLICTS: A Constructive Theory of Neurosis—Karen Horney—*Norton*, 250 p., $3.

TEXT-BOOK ON SPHERICAL ASTRONOMY —W. M. Smart—*Macmillan*, 430 p., illus., $4.75. 4th ed., revised and enlarged.

Science News Letter, September 22, 1945

Hybrid corn occupies two-thirds of the total corn acreage in the United States this year.

In the Maintenance of the Hemoglobin Level

In the continuous process of destruction and regeneration of erythrocytes by which the oxygen-carrying capacity of the blood is maintained, the extent of hemoglobin synthesis depends largely on the protein supplied to the organism.

Protein is an essential "raw material" for the formation of the hemoglobin molecule. Unless the protein made available to the organism is adequate in quantity and quality, anemia supervenes.

The only source of the protein required for maintenance of the hemoglobin level is the protein derived from the foods eaten.

Among the protein foods of man meat ranks high—not only because of the percentage of protein contained, but principally because the protein of meat is of high biologic quality—able to satisfy every protein need.

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Science News Letter, September 22, 1945

⚙ *INFANT COTS, particularly for maternity hospitals, are supported on legs equipped with casters, and have side clamps by which they may be easily attached together. Either one or several together may be rolled by one person to the bedsides of the mothers.*

Science News Letter, September 22, 1945

⚙ *ANTI-RATTLER for windows, inserted only where needed, is a flat double piece of hard brass with a wedge-shaped end to push between sash and frame. The front piece of the two double pieces curves outward for convenience in handling, then inward so that its springy free end presses the sash.*

Science News Letter, September 22, 1945

⚙ *SEAT attachment which may be applied to any ordinary crutch, has a clamp to hold it on the staff at the proper place. When opened, the seat, legs pivotally attached to the clamp, and crutch form a three-legged chair.*

Science News Letter, September 22, 1945

⚙ *BOW-TIE vane on the tip of a bomb nose fuze controls the arming time which must elapse before the falling bomb can explode. In falling the vane, seen in the picture, revolves a predetermined number of times before it flies off releasing safety blocks, and leaving the fuze armed ready for firing.*

Science News Letter, September 22, 1945

⚙ *MINIATURE voltmeters, ammeters, milliammeters and microammeters, one inch in diameter and weighing 1¼ ounces, are hermetically sealed in rugged aluminum cases, and have high accuracy. They are usable in aircraft and portable equipment fields.*

Science News Letter, September 22, 1945

⚙ *SHARPENING instrument, which resembles the ordinary "steel" for carving knives, has an elongated center section of metal with four deep longitudinal grooves that hold different abrasives of varying coarseness. It is particularly suitable for sharpening hollow-ground carving knives.*

Science News Letter, September 22, 1945

⚙ *WOOD [illegible]EW, [illegible] a straight cylindrical shank of uniform diameter and sharp-faced knife-like threads of greater height than base on the shank, has maximum holding qualities when screwed crosswise or lengthwise of the grain of the wood. The threads have a steep pitch.*

Science News Letter, September 22, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 277.*

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Question Box

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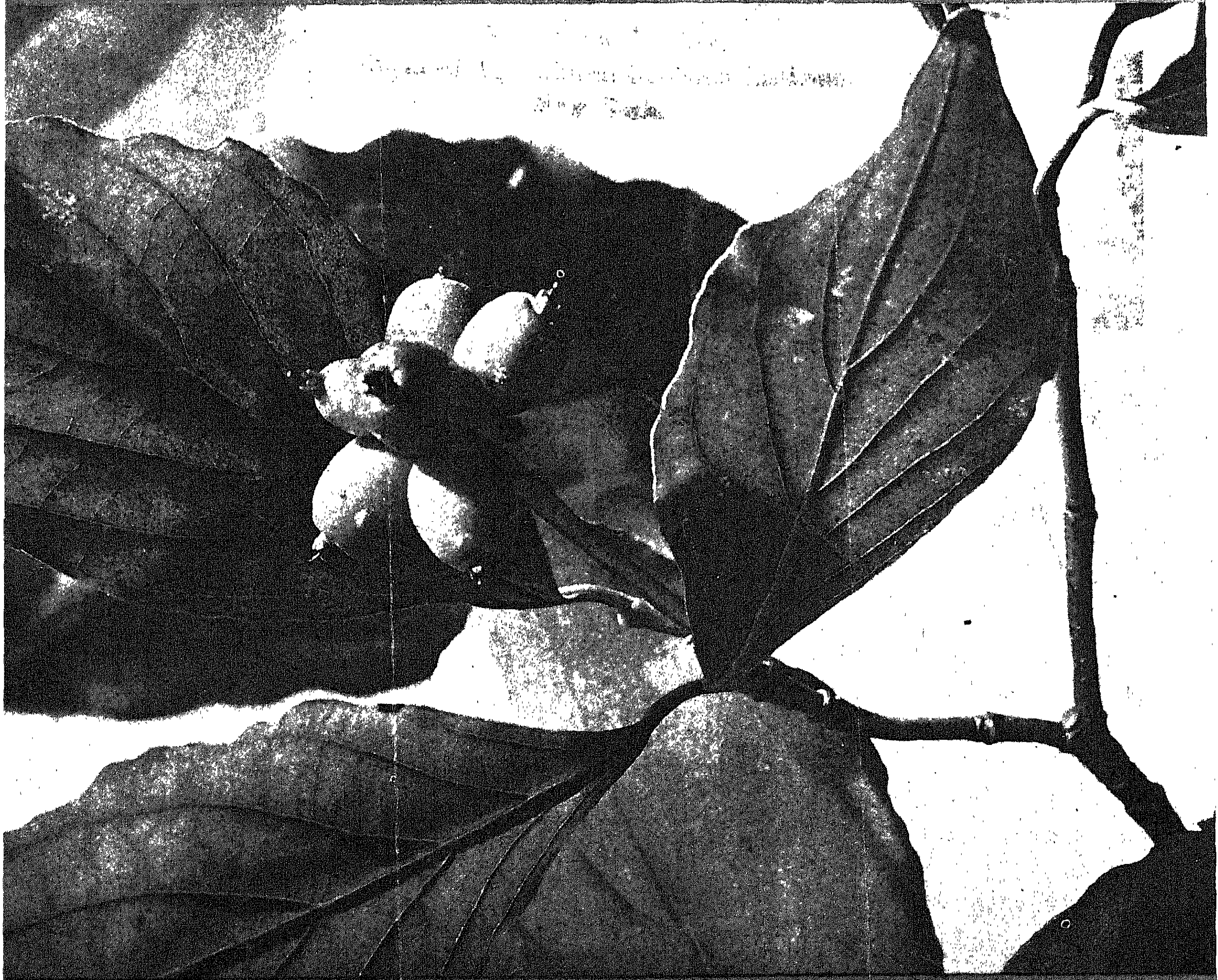
CIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • SEPTEMBER 29, 1945



Fall Fruit

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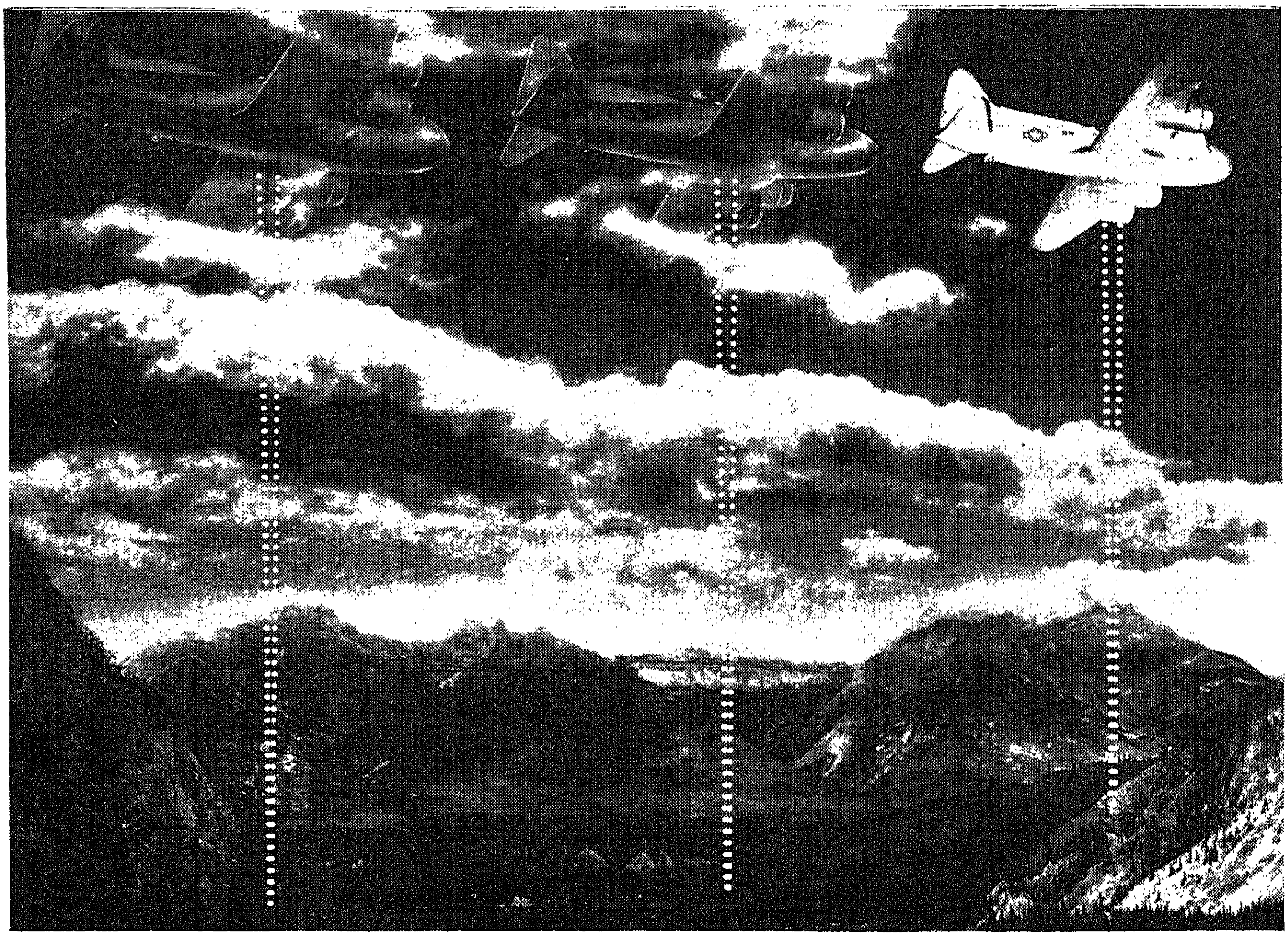
A SCIENCE SERVICE PUBLICATION



The RCA Radio Altimeter assures that the last mountains have been passed before letting down to the airport in the valley below.

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A radio altimeter—that indicates the exact height above land or sea—is another RCA contribution to aviation.

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Radio Corporation of America, Radio City, New York 20. *Listen to The RCA Show, Sunday, 4:30 P. M., E. T., over NBC.*

The RCA radio altimeter will be a major contribution to the safety of post-war commercial flying. The section at the left sends the radio waves to earth and back again while the "box" at the right—timing these waves to the millionth of a second—tells the navigator the plane's exact height in feet.

RCA RADIO CORPORATION of AMERICA

MEDICINE

Streptomycin for TB

Limited suppressive effect has been obtained, but no one knows what final answer will be. Warning comes not to hope for too much.

➤ STREPTOMYCIN, penicillin-like medical weapon which proved strikingly effective in controlling tuberculosis in guinea pigs, has now been given to 34 human patients suffering from this disease.

The results of this first trial of the remedy in human tuberculosis are reported by Dr. H. C. Hinshaw and Dr. W. H. Feldman, of the Mayo Clinic and Foundation in the *Proceedings of the Staff Meetings* of the Mayo Clinic.

A "limited suppressive effect" on the disease, especially in some of the more unusual types of tuberculosis, was obtained through streptomycin treatment.

Many of the cases in which streptomycin was tried were apparently hopeless. In these the drug brought about some improvement and perhaps prolonged the lives of the patients. Yet nowhere in the report is there any statement to justify hailing this new drug as a swift and sure cure for tuberculosis.

An unusual feature of the report is the inclusion of a paragraph indirectly addressed to lay persons. In this the scientists, who obviously restrained their report to the most conservative statements, urge the layman who may hear of it to adopt "the same cautious frame of mind." In other words, not too much hope should be aroused by the results so far.

"No one as yet knows what the final judgment will be concerning the effect of streptomycin on clinical tuberculosis," they state.

Care in a sanatorium and collapse therapy, proved and effective methods of treating tuberculosis, should "in no instance" be abandoned for treatment with streptomycin or other antibacterial substances whose value has not yet been conclusively shown.

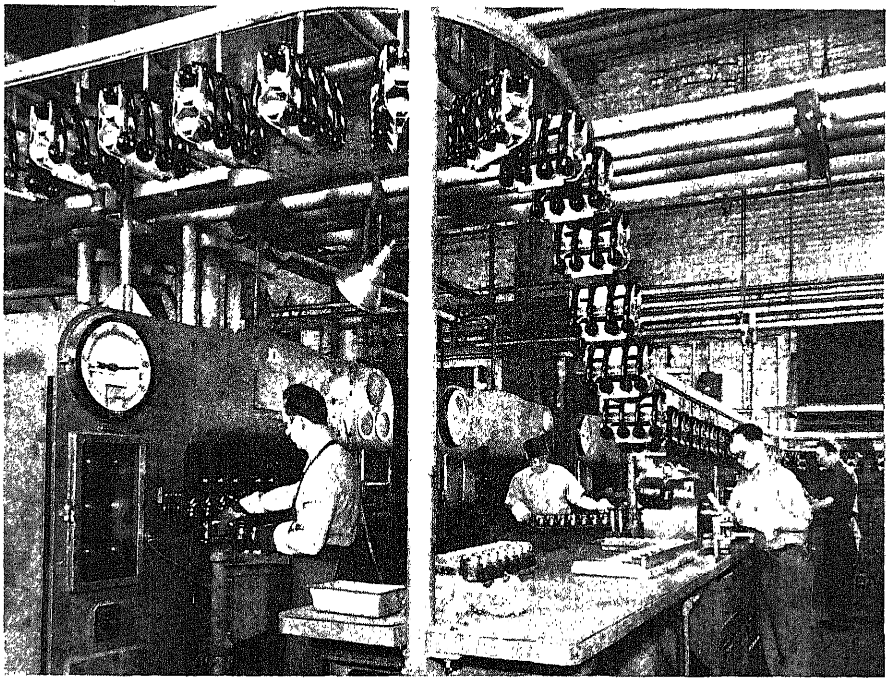
Very much in favor of streptomycin is its safety, as shown by study of the 34 patients to whom it was given by injection into the muscles every three hours and in some cases for several weeks without interruption. Most patients complained of feeling a little sick and of aching muscles and pain where the injections were made. The pain is no worse than that produced by penicillin. Since most of the patients to whom streptomycin was given had little chance for rapid recovery, if any, they did not mind the discomfort of the new treatment that might help them. As more purified lots of streptomycin have become available, there have been less severe reactions to it.

Streptomycin seems to have the best effect in patients with unusual and particularly dangerous forms of tuberculosis, such as tuberculosis of kidneys and bladder and the type known medically as miliary tuberculosis. In miliary tuberculosis the disease is not limited to the lungs but is spread through the body by the blood stream and usually is rapidly fatal.

In two patients with this form of tuberculosis, one of whom also had tuberculosis of the kidneys, "unmistakable and striking improvement" of the tuberculous condition of the lungs appeared in X-ray pictures. Improvement in the general condition of the patients, however, did not parallel that shown in the chest X-rays, and the physicians believe the disease has become localized in some inaccessible regions of the body.

Encouraging results were obtained when streptomycin was given to four patients with tuberculosis of the bladder or kidneys. Each of these had only one kidney, the other having been removed because of the tuberculous condition. Each was excreting tuberculosis germs before streptomycin treatment was started. This stopped within two to four weeks and no germs have been found up to four months after the drug was stopped.

Some of the patients with tuberculosis of the lungs, on the other hand, although they seem to respond to streptomycin, apparently are better only so long as they are taking the drug. In some cases the tuberculous process is reactivated promptly after treatment is stopped. Extensive, progressive lung damage known to be of recent origin tended to improve promptly in a manner resembling the natural processes of healing. The drug, however, did not seem to have any rapidly effective curative action in these cases.



FOR CIVILIANS—100,000 telephones a month are now being manufactured by Western Electric, and this rate will be increased as rapidly as possible. In addition to telephone instruments, cables and complex switchboards are needed at many locations, and production will be increased with all possible speed.

These results lead the scientists to believe that streptomycin checks the growth of the tuberculosis germs, thus suppressing the symptoms of the disease, but that it does not actually kill the germs and in that sense cure the disease.

A few patients with tuberculosis of the skin were given streptomycin. Not enough time has elapsed to be sure of the permanency of the results in these patients, but in three of them inflamed lymph glands that were discharging pus cleared up promptly.

Streptomycin, obtained from a mold-like germ that lives in the soil, was discovered by Dr. Selman A. Waksman and associates of Rutgers University and the New Jersey Agricultural Experiment Station. His finding that the germ-chemical was a powerful weapon against tuberculosis germs in the test tube led to its trials by the Mayo scientists.

When it showed itself much less toxic and more powerful than any of the sulfone drugs previously used in treatment of experimental tuberculosis of guinea pigs, trials on human patients were started. In these Drs. Feldman and Hinshaw had the assistance of Dr. Karl Pfuetze, of Mineral Springs Sanatorium, and of colleagues at the Mayo Clinic, including Drs. Herman Moersch, Arthur Olsen, Harry Wood, Wallace Herrell, Fordyce Heilman, Dorothy Heilman, Robert Glover, R. L. J. Kennedy, L. F. Greene, W. G. Braasch, E. N. Cook, P. A. O'Leary, E. T. Ceder, L. A. Brunsting and F. A. Figi.

Science News Letter, September 29, 1945

MEDICINE

Blood Pressure Chemical

High blood pressure believed due to lack of essential substance like lack of insulin in diabetes. Search for practical replacement medicine.

➤ PATIENTS with serious high blood pressure, known medically as essential hypertension, may in future be taking regular doses of a new medicine to keep the blood pressure at safe levels just as diabetics today take regular doses of insulin to stay healthy.

This blood-pressure-lowering chemical is not yet ready for general use, but steps leading to its development have been taken by Drs. Arthur Grollman and Tinsley R. Harrison of the Southwestern Medical College in Dallas, Tex.

The incretory substance, as Dr. Grollman terms it, was first discovered in the kidneys. Medical men long ago believed the kidneys played a part in the development of high blood pressure, but the idea that these organs which act primarily as filters and waste handlers produce a chemical essential for maintaining normal blood pressure is relatively new. High blood pressure results, Dr. Grollman believes, when these organs are damaged so that they cannot produce this essential substance.

The substitution treatment, when it is ready for use, will help patients of all ages because it corrects the fundamental defect that causes the high blood pressure, replacing the substance which the patient's own kidneys fail to produce.

Right now Dr. Grollman is searching for a way to make this hormone generally available to the million or more essential hypertension patients in the nation. When made by extracting it from kidneys, 100 pounds of hog kidneys are needed to supply one day's dose for one patient.

Since the patients would have to go on taking the extract daily throughout life, this is obviously not a practical source.

The effective agent may also be prepared from the liver oils of certain fishes. Supplies of these fish liver oils are also somewhat limited and are needed as sources of vitamin A and vitamin D. (It is not the vitamins but another chemical in the oil which lowers blood pressure.) Certain plant oils may also ultimately be a source from which the compound may be made, Dr. Grollman stated in a report to the third annual hormone conference at Mont Tremblant, Canada.

If patients rush to the drug store to get one of the fish liver oils now marketed for their vitamin content, they are doomed to disappointment, Dr. Grollman warned. These oils do not contain the chemical in enough amount, if they contain it at all, to lower blood pressure.

Even with an abundant supply, patients would soon find it difficult to take nearly two ounces of oil daily, which is what would be required. So Dr. Grollman hopes the chemical itself can be extracted and put into a pill or some pleasant form of medicine.

Science News Letter, September 29, 1945

CHEMISTRY

Some Dried Vegetables Keep Better Than Others

➤ DEHYDRATED corn and sweet potatoes keep well, scientists of the U. S. Department of Agriculture found in studies of dehydration and prolonged storage of several common vegetables. Along with dehydrated beets and green beans, these four vegetables keep better than dehydrated white potatoes. But carrots, housewives should note, become poor or inedible sooner than any of these vegetables.

Science News Letter, September 29, 1945

SCIENCE NEWS LETTER

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ORDNANCE

Pill-Sized Primers

Weighing only 2.8 grains, they were used in the famous "goop" bombs which rained destructive blows on Japan before the atomic bomb fell.

➤ JAPAN'S cities flamed and smoldered to ashes for weeks before the two atomic bombs delivered their "haymaker" punches, under a rain of the most destructive incendiary missiles that war has ever known. Each of these "goop" bombs, as the GI's called them, was roused to demoniac life as it struck, by the tiniest detonating primer with which any bomb was armed. It was literally pill-sized, weighing less than half as much as an ordinary aspirin tablet.

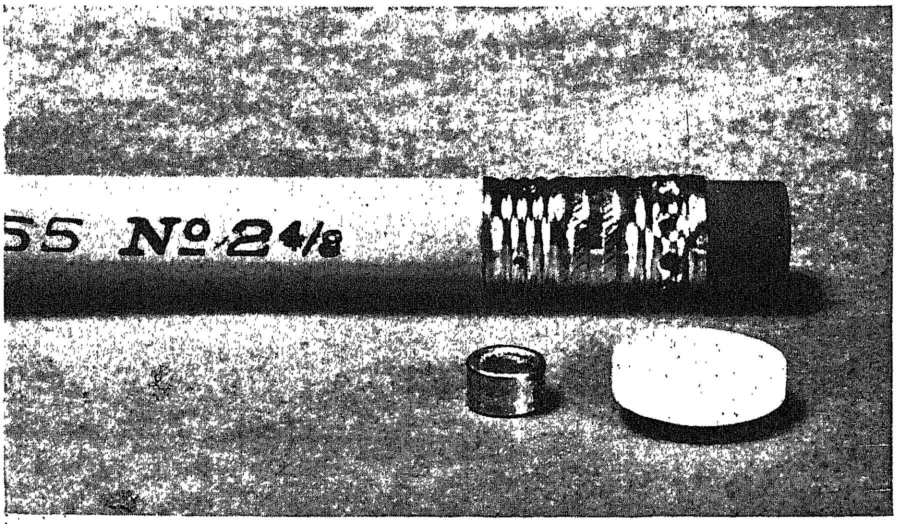
Details of this primer have been released from military security restrictions by the War Department. The pinch of detonating chemical was contained in a copper-alloy cup only 3/32 of an inch high and 3/16 of an inch in diameter. Complete, it weighed 2.8 grains; a pound of the new primers sufficed to arm 2,500 fire bombs.

To make its action most sensitive, the primer was arranged so as to fire "backwards." Most primers, for example those in the bases of ordinary cartridges, are struck hard on their metal bottoms, and the flame of the detonating compound within bursts out of the open top to fire the main charge. In the "goop" bomb primer, the open top, covered only with a very thin brass foil, faced the firing pin, and when the pin struck into the touchy chemical within it exploded through the metal bottom, igniting the incendiary mixture in the body of the bomb.

The new primers were filled under conditions of extreme safety precautions, with the loading-machine operators working from behind steel barricades by remote control. Accident figures stayed at a gratifying "low" throughout the period of manufacture.

The Western Cartridge Company, at East Alton, Ill., produced them for the Chemical Warfare Service, and large quantities were also manufactured by the Army's own Picatinny Arsenal, in Pennsylvania.

Science News Letter, September 29, 1945



COMPARISON—Here is a 5-grain aspirin tablet, a pencil and the tiny primer used to detonate Uncle Sam's famous "goop" fire bombs. The primer weighs only 2.8 grains.

GEOGRAPHY

Canadian Leads Expedition Across Little-Known Land

➤ A CANADIAN missionary-botanist, Pére Arthème Dutilly, has returned after leading an expedition across an almost unknown corner of Arctic America. With two other scientists and three Indian guides, he made the traverse across the northern tip of the Labrador peninsula, from the Gulf of Richmond on its western coast to Ungava bay on the Atlantic side. It was his twelfth successive trip to the Far North.

Pére Dutilly brought out more than 4000 sheets of pressed plants, together with many other specimens of scientific value. These will be taken to the Catholic University of America in Washington, D. C., where he conducts his researches in the winter.

The journey of 400 miles took 22 days to complete, going by canoe up the Stillwater river, over the Divide, and down the Larch and Koksook rivers to Fort Chimo on Ungava bay. He describes the rivers as "very intriguing" — in one stretch of 54 miles there were 70 rapids, where the voyageurs had to choose between shooting and portaging. At Fort Chimo, after a wait of six days, he was able to find a seat on a plane which took him to Moncton, N. B., where he transferred to another plane to complete his journey to Montreal.

Pére Dutilly's companions on his journey were the Abbé Ernest Lepage, director of studies at the Rimouski College of Agriculture, and Prof. Pierre Dagenais, geographer at the Jacques Cartier Normal School.

This is only the second time that this difficult traverse has been made. It was first made by Dr. E. A. Low, a geologist, in 1896.

Science News Letter, September 29, 1945

ENGINEERING

Electric Wires Insulated With Sodium Silicate

➤ THREE chemists employed by the Chicago plant of Western Electric Company, Dr. H. F. Fruth, Dr. W. O. Haas, Jr., and Dr. E. G. Walters, have assigned to that firm their rights in patent 2,384,542, on a method for insulating electric wires with sodium silicate, long familiar as a cheap adhesive and as a preservative for eggs. This compound is known to be a good insulator, but it has suffered from a double drawback. If applied to the wire in melted condition it becomes too brittle on hardening; if put on in a water solution it tends to take up water out of the atmosphere after it has dried. The three chemists have found that if the silicate is applied in solution and the coated wire then heated, the silicate remains as a good and flexible insulation, but is not hygroscopic. Best results are obtained with a sodium silicate in which the ratio of silicon to soda is relatively high.

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MEDICINE

Colchicine for Leukemia

Given when the disease was acute and soon after the symptoms had appeared, the patient's life was prolonged, although not saved.

➤ A NEW kind of attack on acute leukemia, fatal disease of the blood-forming organs, is reported by Dr. W. Harding Kneedler, of Philadelphia, in the *Journal of the American Medical Association,* (Sept. 22). This is the trial of colchicine in treatment of the disease.

In the case in which Dr. Kneedler tried it, the patient's life was perhaps prolonged although not saved. The drug was given when the disease was acute and soon after symptoms had appeared. The patient's downhill course slackened through eight months and there was a three-month period of improvement with gain in weight and strength before she slipped into the final stages of the disease.

Although Dr. Kneedler says that no conclusions as to the beneficial effects of colchicine can be drawn from this case, he believes further trial of the drug seems justified.

He used it at the suggestion of Dr. O. H. Perry Pepper, professor of medicine at the University of Pennsylvania School of Medicine, who had previously tried it in two cases. In one of these it had no effect but in the other there was complete abatement of symptoms for a time although this patient also subsequently died. There is one other report in medical literature of its trial in acute leukemia.

Colchicine is obtained from the autumn-flowering crocus of Europe and Asia. It has been used as a remedy for gout and rheumatism. Its effect in arresting the phase of cell division known as mitosis in plants and animals, and the special susceptibility of rapidly growing malignant tissue like cancer to colchicine, form the basis for its trial in leukemia.

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MEDICINE

Penicillin Inhalations

Can be given in doctor's office to help colds, bronchitis, asthma, pneumonitis and allergies. Brings chemical into direct contact with germs at invasion site.

➤ THE PATIENT who gets bronchitis, an asthma attack, pneumonitis, or even a cold or migraine headaches this coming winter may get relief through penicillin mist inhalation treatments given at his doctor's office or his own home.

These and other disabilities in more than 200 patients have been relieved or improved by this use of the mold chemical, technically known as aerosol penicillin, Dr. Herbert N. Vermilye, of Forest Hills, N. Y., reports in the *Journal of the American Medical Association,* (Sept. 22).

While penicillin is not effective against the virus of the common cold, Dr. Vermilye found that patients got over colds faster when given the penicillin mist inhalations. This was especially true in the case of persons who usually develop a heavy cough with much sputum a few days after the cold starts. Many were apparently well in one or two days although the treatment was continued for five days. Dr. Vermilye believes the reason for this rapid recovery is that the penicillin prevented secondary bacterial infections arising to complicate the cold.

Patients getting this treatment have a feeling of well-being and their appetites improve. This may be one factor, Dr. Vermilye suggests, that leads to the rapid recovery.

Migraine, high blood pressure, eczema, rosacea, colitis, extreme fatigue and even mild psychoneurosis are other conditions which were helped by the penicillin mist inhalations, Dr. Vermilye reports. He explains that this was because the conditions were the result of allergy to bacteria infecting the nose, throat and sinuses. Dr. Vermilye does not suggest that such conditions due to causes other than bacterial allergy would be helped by penicillin mist inhalations.

The fact that aerosol penicillin can be given in the doctor's office or the patient's home, instead of by hypodermic injection every three hours in a hospital, gives it many obvious practical advantages. From the standpoint of treatment, this use of penicillin has the advantage of bringing the mold chemical into direct contact with the disease germs at the site of their invasion of the body.

The rapid improvement in such stubborn conditions as intrinsic bacterial asthma is "notable," Dr. Vermilye states. By intrinsic bacterial asthma he means a kind believed due to chronic infection in the upper respiratory tract. The results in this condition, Dr. Vermilye states, encourage the hope that "at last a promising therapeutic weapon is available for that intractable condition."

Acute and relapsing pneumonitis due to various cocci, tonsillitis, sinusitis, sinobronchitis and pharyngitis with stomach and intestinal symptoms are other conditions in which Dr. Vermilye reports aerosol penicillin was beneficial.

The apparatus used for converting the penicillin into a very fine mist is available from most oxygen equipment companies and may be obtained for about $10 if a small portable oxygen tank is used, Dr. Vermilye states. With 10 or more outfits a physician can treat at least 20 patients a week without the assistance of a nurse, once the patient understands how to take the inhalations.

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ELASTIC—Bouncy sodium silicate is created when the silicate has dried to about 94% of its original content. The material can be rolled into a ball that will rebound like rubber.

LIQUID FROM SOLIDS—A watery substance is produced by mixing the bouncy silicate with small crystals of metasilicate, (left). There is no magic involved, nor is the mixture heated or cooled. When vigorously beaten together, the solution pours because by combining silicates of two extremes in composition, a liquid intermediate product is obtained. Photographs by Fremont Davis, Science Service staff photographer.

CHEMISTRY

Bounces Like Rubber

Sodium silicate can be rolled up in a ball and bounced when a good deal of the water has been evaporated. No commercial use for this characteristic.

➤ THE SAME stuff that is used to stick corrugated paper together and to preserve eggs, as a trick can be made to bounce like rubber. No commercial use has been found, however, for this characteristic.

When a good deal of the water has evaporated from the well-known adhesive, sodium silicate, it can be rolled up in a ball and bounced. But instead of stretching when pulled, the material crumbles. These crumbs, not unlike those left after using an art-gum eraser, can be molded together again. If left piled on top of each other, they will soon run together to form a smooth, jelly-like mass.

This is just one of the few amazing forms of sodium silicate, chemically related to common sand and commonly sold for egg preservative under the name of water glass. Composed of alkali and silica, two dry silicates may be selected which, when mixed together, produce a liquid which can actually be poured out of the container. Two liquid silicates, on the other hand, can be combined into a solution which pours more slowly than either of the original ingredients.

Not only do some forms of silicate bounce like rubber, yet fail to stretch, but others stretch like taffy and simply refuse to bounce. Varying the relative amount of alkali and silica in the solution, as well as the proportion of water present, makes it possible to perform many apparently magical tricks with silicates, reports the Philadelphia Quartz Company, interested in developing new uses for this amazing material.

The bouncy silicate may be made from one of the highly silicious silicates. When water has evaporated so that it composes only about 65 per cent of the solution, little spheres of the material will bounce when dropped. It looks like cloudy glass and breaks just the way glass does, with a shell-like fracture. If left unprotected in the air, the semi-solid silicate dries out rapidly and becomes brittle.

When the soda-silica ratio is one to one-and-a-half, if water forms only about one-third of the solution it can be pulled into long threads. Sticky to the touch, this semi-solid silicate will not bounce. If chilled a little, it becomes quite hard.

With silicates it is possible to mix two solids and get a liquid. When the bouncy silicate is mixed with an equal amount of small crystals of silicate of soda, the material will pour slowly if the crystals were composed of about one-fourth alkali, one-fourth silica and one-half water. It takes vigorous mechanical beating to produce the liquid, but with patience a soupy solution develops. On continued stirring this thins out to a watery fluid.

A solid can be made by adding liquid caustic soda (though not a silicate, it is an allied product) to a liquid silicate containing slightly more silica than the taffy-like solution referred to above. When the caustic soda is at a temperature of 50 degrees Fahrenheit or less, the mixture freezes solid at room temperature.

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Opossum is Missouri's most abundant fur-bearing game but it is hunted principally for sport and for its edible meat.

PUBLIC HEALTH

Expectation of Life In U. S. Has Increased

➤ THE EXPECTATION of life for industrial workers in the United States actually increased during the war. Rising to 64.4 years in 1944, it was about a half year more than in 1943 and a full year greater than in 1941, our last year of peace, as reflected in the experience of industrial policy-holders of the Metropolitan Life Insurance Company.

Last year the expectation of life for girls of 20, namely 51.35 years, was almost three-quarters of a year greater than in 1941. For insured white males of the same age, just entering their prime, the expectation of life in the war year 1944 was 46.4 years, about one-fifth of a year more than during the last year of peace. Military and civilian deaths from enemy action were not included in the study.

The present situation among colored policyholders, which roughly corresponds to that of whites about two decades ago, shows an even more marked improvement. One and one-third years were added to the life expectation of both males and females during the past three years. Colored males of 20 in 1944 had an expectation of life of 43.42 years, and colored females of the same age an expectation of 45.48 years.

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CONSERVATION

Standard Specifications For Telephone Poles

➤ TELEGRAPH, telephone and other wood poles will soon have to comply with standard specifications prepared under the leadership of the American Standards Association at the request of the government. The prime purpose of the job will be to conserve natural timber supplies, and secondly to channel the production and use of poles so that all users will have a fair share of the available timbers.

"War needs have depleted our timber supply to an extent that we do not yet fully realize," Dr. R. H. Colley of Bell Telephone Laboratories states. Civilian use of poles was cut in half during the war, leaving a big pent-up demand now that restrictions are removed. It is estimated that at least 4,000,000 poles a year during the next few years will be required.

The new specifications will cover wood poles from jack pine, red pine, western white pine, inland types of Douglas fir, western hemlock, western larch, and certain miscellaneous species. The specifications will aim at treatment of every pole with wood preservatives so that the poles will last as long as possible.

The specifications, also, will cover prohibited and permitted defects, such as sap stain, twist grain, insect damage, knots and scars. Such matters as manufacturing, dimensions, storage, and handling will be covered.

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NUTRITION

Skipping Breakfast Gives "All-Gone" Feeling

➤ AS THE season of dark, chilly mornings begins, many persons find it harder than ever to get up in time to eat a good breakfast before starting to work or school. Breakfast-skippers, however, are likely to have an "all-gone" feeling and to slow down at work or study before the morning is over. Going without breakfast, moreover, means that the remaining meals of the day must be quite large in order to make up the deficit in nourishment.

Those who are in the habit of going without breakfast may not feel hungry on arising, even though it is 12 or 14 hours since their last meal. The thought of food may induce distaste or even slight nausea. If you are in this class, you can acquire a good breakfast habit by gradual steps. Each morning eat a little more until you are eating a breakfast that furnishes one-third of the calories you need for the day's activities.

The lightest breakfast menu approved by nutrition authorities consists of fruit, cereal or bread and a beverage. This is considered satisfactory for a desk worker who eats an early lunch. It can be made more nourishing if the cereal or bread is whole grain, since then more body-building material and more B vitamins will be included in the meal.

Adding eggs, bacon or some other meat or fish increases the supply of body-building protein. A good breakfast also includes a glass of milk to supply calcium and the B vitamin called riboflavin. Without milk, it is hard to get enough of these nourishing items in breakfast or, for that matter, in the entire day's food.

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AERONAUTICS

Production Continues On Navy's Super Fighter

➤THE NAVY's newest carrier and land based fighter, the F2G, developed under great military secrecy, but completed too late to see action in the Pacific, will still be produced in limited numbers for Naval service.

Except for slight engineering changes in air intake ports, air-release gills, specially designed rudder and vertical tail stabilizer, its outward appearance closely follows that of the Chance-Vought F4U Corsair. Both planes are built by the Goodyear Aircraft Corporation.

Powered with a 28-cylinder Pratt-Whitney 3,000 horse-power radial engine, the F2G is said to have an initial rate of climb of 7,000 feet a minute, considerably greater than that of the latest jet-propelled planes in operation. Its range is 2,500 miles, and its maximum speed, with water injection, is 450 miles per hour at 16,500 feet. It is armed with six .50-caliber machine guns, eight rockets and two 1,000 pound bombs under the wings and provision has been made for substitution of additional rockets or drop fuel tanks for two half-ton bombs.

The original Vought Corsair, since early 1943 Navy's fastest carrier-based fighter, used by Marine Corps as well as Navy fighter pilots in the Pacific, maintained a high level of efficiency and stamina in combat as both fighter and fighter-bomber until the end of the war.

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IN SCIEN

BIOCHEMISTRY

New Germ-Stopper Found In Water-Chestnuts

➤ A NEW antibiotic, or germ-stopping substance resembling penicillin in its action, has been found by a group of four Chinese scientists in the small round tubers known as water-chestnuts and familiar to patrons of Chinese restaurants everywhere. The research team consists of S. L. Cheng, B. L. Cheng, W. K. Cheng and P. S. Tang, all of Tsing Hua University at Kunming. They report their results briefly in a letter to the editor of *Nature,* (Aug. 25).

Unlike penicillin, the newly discovered antibiotic is not soluble in organic solvents such as ether and benzene. It can be destroyed by moderate heating. War-caused lack of proper laboratory equipment has thus far prevented the workers from preparing it in purified form.

It has been given the name "puchiin," from the Chinese characters that stand for the plant from which it is derived. To botanists it is known as *Eleocharis tuberosa;* it is a member of the sedge family.

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CHEMISTRY

New Method Offered For Obtaining Sulfur

➤ SULFUR, one of the commonest and most useful of chemical elements, can be salvaged from foul-smelling hydrogen sulfide by a newly patented process developed by Minor C. K. Jones of Mountainside, N. J.

Hydrogen sulfide is a problem product of many industrial processes, such as oil refining and making coal gas. It is also present in quantities in some natural gases. It is poisonous, and besides, it smells like rotten eggs, so that nobody wants it around.

Mr. Jones' method is to put it with another sulfurous gas, sulfur dioxide, in the presence of a catalyst at high temperature and under pressure. The hydrogen from the one gas and the oxygen from the other combine to form water, and the sulfur from both comes out uncombined and in a high state of purity.

Rights in this patent are assigned to the Standard Oil Development company.

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E FIELDS

GENERAL SCIENCE

President Urged to Prevent Drafting of Scientists

➤ YOUNG scientists, future key men in the creation of new job-providing industries, should not be drafted for routine duty in armies of occupation, *Chemical and Engineering News* declares editorially. The editorial calls upon President Truman to intervene to this end, and adds that "if he fails among his overwhelming responsibilities to visualize the seriousness of the situation, then Congress must, without further delay, assert its authority and control the military before well-considered plans for full employment are made largely valueless and the future of America is placed in jeopardy."

The journal calls attention to the present grave lack of trained scientists for research and teaching tasks, caused by the indiscriminate drafting of young men away from their laboratories and classrooms during the war emergency, and comments sharply on "the unwillingness of the Army to interpret intelligently the Selective Service Act." No emergency exists now that might give even the color of an excuse for a repetition of this blunder, it is pointed out. Instead, it is highly important that scientifically talented young men be encouraged and helped to complete their training without interruption, so that the present gap in America's ranks of researchers may be closed up as soon as possible.

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AERONAUTICS

Airliner Able to Circle Globe in 45 Hours

➤ AROUND the world in 45 hours—New York to London in nine, or to Mexico City in five hours—may soon be normal schedules for the Republic Rainbow, 40-passenger luxury airliner under development in Farmingdale, N. Y., by the Republic Aviation Corporation.

Believed to be the fastest transport plane ever conceived, the Rainbow's four radial engines will permit flight around or over the most inclement weather, carrying a crew of seven, 1,600 pounds of baggage and 1,700 pounds of cargo in addition to the 40 passengers.

Just as Republic's fighter, the Thunderbolt, was built to meet definite military requirements, the Rainbow is being especially designed and constructed after a careful survey of the needs of the airlines, and the postwar expectations of veteran air travelers. In addition to war-tested principles of superior construction, numerous exclusive innovations will assure reliability and safety. The noise-proof, pressurized cabin, finished in harmonious textures and colors, will feature complete dining facilities, lounge, bar, plane-to-ground telephone, motion pictures and fluorescent lighting, assuring complete comfort regardless of altitude.

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BOTANY

Dogwood Tree Bears Holly-Like Berries

See Front Cover

➤ A GREAT many people do not realize that the dogwood tree, so lovely in the spring, is also a striking sight in the fall. Red berries, four or six to a cluster, make a pleasing contrast to the dark green leaves. The photograph of the dogwood berries on the front cover of this SCIENCE NEWS LETTER was taken by Fremont Davis, Science Service staff photographer.

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HERPETOLOGY

Turtles Seldom Travel More Than 300 Yards

➤ TURTLES don't like to travel, at least Florida turtles don't.

They seldom go more than 300 yards, or less than one-fifth of a mile, from their original habitat. A turtle could easily cover this distance in a single day, states Lewis J. Marchand, University of Florida.

As many as 45 of these lazy travelers, 30 per cent of those found around Crystal Springs in Pasco County, whose tough shells Mr. Marchand marked with a hand-drill, were located during the following two years near this region.

Turtles released at Rainbow Run in Marion County, seemed more inclined to wander, several miles being not uncommon, Mr. Marchand reported to the American Society of Ichthyologists and Herpetologists. This sudden desire to travel, however, may have been largely due to the fact that a large number were released simultaneously at one spot, he states, although the character of the environment would also greatly influence the normal range of the turtles.

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CHEMISTRY

Metal Foils Keep Moisture from Walls

➤ ALUMINUM, copper and other metal foils may be used as a base for decorative wall finishes in future homes. New decorative finishes are being developed to replace conventional wallpaper because of the need to keep moisture in the room from seeping into the house walls, thus causing supporting timbers to rot.

Wallpaper applied with a vapor-resistant adhesive reduced 100-fold the amount of moisture vapor which passed through the wall, investigations at the National Bureau of Standards showed. Samples of the same wallpapers applied in the usual manner were found to allow about 38 ounces of moisture per square yard per day to pass through the wall. Wallpapers having a vapor-resistant coating on the face and applied in the usual manner likewise reduced 100-fold the amount of moisture vapor passing through.

So far, however, no vapor-resistant adhesive or coating has been found that does not disfigure wallpaper. Vapor-resistant plastic sheetings, though difficult to apply, were found quite satisfactory. Paint films and varnishes with and without metal powders were easy to apply, but gave variable results. Good aluminum, copper and other metal foils were in most cases impervious to moisture vapor.

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METALLURGY

Method for Recovering Magnesium from Scrap

➤ A METHOD for recovering magnesium from turnings, borings and other scrap in which it is mixed with other metals is the subject of patent 2,383,659, obtained by Y. E. Lebedeff of Metuchen, N. J., who has assigned his rights to the American Smelting and Refining Company. First a molten bath of a collector metal, like lead or zinc, is prepared. This is covered by a slag composed of a mixture of lead chloride or the like, mixed with common salt. The bath is heated to about 900 degrees Fahrenheit, and stirred vigorously, while the magnesium scrap is poured in. After about an hour of stirring, the slag will have collected practically all the impurities and can be skimmed off, leaving the magnesium behind.

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ASTRONOMY

Autumn Stars Now Shine

The first planets of October nights, Mars and Saturn, arise late. The stars of the Great Square and Northern Cross are visible.

By JAMES STOKLEY

➤ WITH NAKED-EYE planets absent from the evening sky in October, this is a good time to concentrate on getting acquainted with the stars of autumn, and the constellations into which they are formed. Some of these go back into the dim mists of antiquity, while a few have been added in more modern times. Often there is slight resemblance between the object after which it is named and the grouping of the stars. But perhaps we should not expect to find these things accurately pictured, any more than we would feel that the State of Washington ought to form a picture of George. The constellations are really areas of the sky, just as the states are areas of the United States, and the arrangement of the stars in them is as fortuitous as is the arrangement of the cities in the states.

Looking at the stars we are apt to see geometrical figures. High in the south, for example, there are four stars of similar brightness that form a square, indicated on the map as "Great Square." But this is not a true constellation. Three of the stars in it are in the group of Pegasus, the winged horse, and on the old star maps, which showed the actual figures around the stars, the horse was placed upside down for some unknown reason. The angular row of stars extending westward from the lower right-hand star of the square formed the animal's head, and the group of stars just above the word "Pegasus" on the map formed his forelegs. Only the front half of the horse was shown.

Many Stars

Alpheratz, the star in the upper left corner of the square, is in the constellation of Andromeda, the princess who, in mythology, was chained to a rock, to be rescued by Perseus, who is himself represented in another constellation nearby. He is to the northeast, just above the bright star Capella, in the figure of Auriga, the charioteer. To the left of Perseus is Andromeda's mother, the queen Cassiopeia, and still farther to the left is Cepheus, the king.

High in the west, next to Cepheus, we see Cygnus, the swan, in which there is a group of stars forming the Northern Cross, a much more perfect cross than its more famed southern counterpart, which is now invisible from most of the United States. Deneb is the bright star in Cygnus, at the top of the cross, which stands vertically at this time of year.

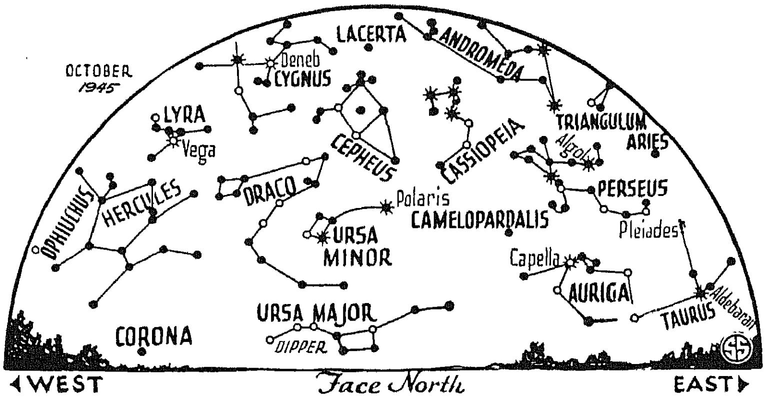
Below Cygnus is Lyra, the lyre, said to have been the one used by the mythological Orpheus, and in it is the bright star Vega. To the left of Vega is Aquila, the eagle, in which the first magnitude star Altair is found. Below Lyra is Hercules, the strong man, and next to him, to the right, is Draco, the dragon, which winds around Ursa Minor, the little bear, in which the pole star is located. Below Draco, now in its poorest position of the year, is the great dipper, in Ursa Major, the great bear.

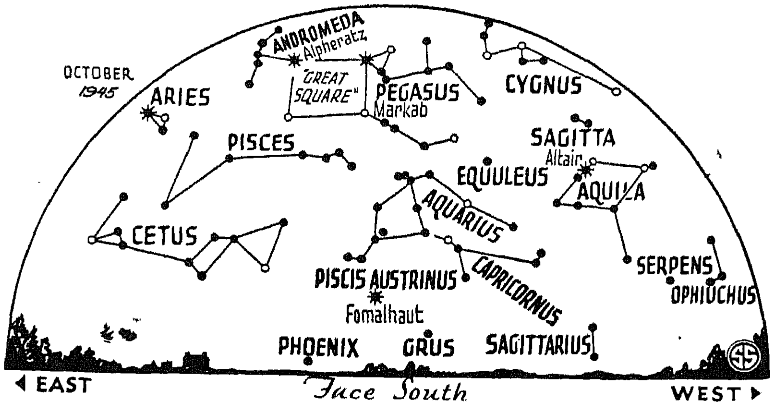
Going back to the square, we find a sort of V-shaped group of stars below and to its left. These form Pisces, the fishes, one of the "zodiacal" constellations, through which the sun and moon and planets move. Aquarius, the water carrier, just below the head of Pegasus, is another, and so is the rather faint constellation of Capricornus, half fish and half goat, which is next to the right. To the left of Pisces is still another, Aries the ram, and then after that we have Taurus, the bull, with brilliant Aldebaran, just appearing in the east, a group which will become more and more prominent as winter comes.

"Water" Stars

For some unknown reason this part of the sky contains a number of constellations having some connection with water. We have already mentioned Pisces, Aquarius, Capricornus. Just below Aquarius is the bright star Fomalhaut, in Piscis Austrinus, the southern fish, and to the left, below Pisces, is Cetus, a sea monster, supposed to be the one that would have devoured Andromeda had Perseus not rescued her.

All these constellations are represented on the accompanying maps, which de-





✡ ✱ ● • SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS pict the sky as at 10:00 p.m., standard time, Oct. 1, and an hour earlier at the middle of the month. It is still later that the first planets arise. These are Mars and Saturn, both of which are in the constellation of Gemini, the twins, which is next to Taurus in the zodiac. Saturn is slightly the brighter of the two, but Mars is red in color and can easily be identified. Much brighter are two other planets which come up later—about two hours before sunrise—in the constellation of Virgo, the virgin. These are Jupiter, which will be seen at the end of the month, and Venus, with Venus considerably brighter. It is moving to the east, and will pass Jupiter on Oct. 30, so on that morning they will be very close together.

Hazy Light

In the constellation of Andromeda, if the night is dark and the sky is clear, it is possible to see a hazy spot of light. If you find this, you are probably seeing the oldest light that ever entered your eye, for the light waves that now fall on your retina, and excite the optic centers of your brain, have been on the way for the past three quarters of a million years. This hazy spot is the nearest of the other galaxies, great clusters of stars of which the whole Milky Way system, of which we are part, is another example. No other galaxy can be seen with the naked eye, though thousands are visible with large telescopes.

Before its nature was understood, this galaxy was often referred to as the Andromeda nebula, and it was considered to be similar to the other nebulae, such as one in the constellation of Orion which we see in the winter sky; that is, a huge cloud of gas, made to glow by the radiation of stars within it. It had been found that the Andromeda object, and others like it, had a characteristic spiral structure, and they were called spiral nebulae. but still they were believed to be part of the grind-stone-shaped galaxy, making up the Milky Way, and most of the stars that we see.

Separate Stars

Twenty years ago, with photographs made at Mt. Wilson Observatory, the Andromeda "nebula" was resolved into separate stars. Some of these were of a kind that permitted astronomers to tell their candlepower. Then, knowing how bright they looked, it was possible to figure their distance, and thus it became apparent that this "nebula" was beyond the limits of our system. There are a few others that are close enough to reveal separate stars, when observed with the biggest telescopes, but most of them are farther away. With the present world's largest telescope—the 100-inch at Mt. Wilson—galaxies can be recorded that are so far that their light, traveling 186,000 miles every second, takes 500,000,000 years to reach us. The new 200-inch, which will be completed at Mt. Palomar in southern California perhaps a year after work upon it is resumed, will reach out to twice this distance.

Celestial Time Table for October

Oct.	EST	
1	5:00 a. m.	Jupiter in line with sun
3	6:39 a. m.	Moon passes Venus
6	12:22 a. m.	New moon
8	8:00 a. m.	Moon farthest, distance 252,500 miles
14	4.38 a. m.	Moon in first quarter
21	12:32 a. m.	Full moon
	9:00 a. m.	Moon nearest, distance 221,700 miles
26	2:00 a. m.	Mars passes Saturn
26	11:48 p. m.	Moon passes Saturn
	12:25 a. m.	Moon passes Mars
	5:30 p. m.	Moon in last quarter
30	3:00 a. m.	Venus passes Jupiter

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NOW!

YOU Can Buy One of These B&L Navy Binoculars

● Here's your chance to own one of the finest binoculars ever built. This big, well-balanced glass gives you seeing power you never enjoyed in prewar binoculars. Look at a few of its advantages:

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Do You Know?

The color and flavor of *fats* are not of nutritive significance.

Coconuts are produced by four year old trees but full production is about the tenth year.

Tomatoes, pole beans, cucumbers and squash can be trained to the garden fence.

Asiatic *chestnuts* are being successfully grown in Ohio; they are resistant to the blight that killed practically all American chestnut trees since about 1900.

The strength of *copper* when cast, forged or in sheets is approximately 36,000 pounds per square inch; in the form of wire it is approximately 62,000 pounds per square inch.

Seaweed-derived *chemicals* have numerous uses and additional possible uses in the production of foodstuffs, textiles, transparent paper, plastics, sizing substances, and surgical, medical, and dental materials.

In spite of the availability again of natural rubber from the Far East, the *Castilla tree,* found from Mexico to Peru, may contribute to the future needs of the Western Hemisphere because its milky juice has certain special qualities.

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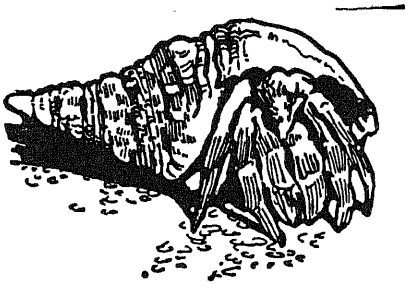
NATURAL HISTORY

NATURE RAMBLINGS

by Frank Thone



Naturalists Needed

➤ LITTLE ISLANDS by the hundred have been dropped into Uncle Sam's lap by the collapse of Japan's far-flung but flimsy ocean empire. For some of them we had to fight fiercely and bloodily, but aside from these key positions there are many other atolls and jutting tops of submarine volcanoes which we shall have to administer.

All these islands have their populations of plant and animal life, and their fringes of swarming marine organisms. Some of these areas are rich in species, some are literally bits of ocean-surrounded desert. But all will prove interesting to anyone who looks at them with the eye of a naturalist—no matter how modest his formal training. The young men of our peace-time Army who may be sent to garrison them can escape island boredom and make really worth-while contributions to knowledge by making collections and studying and photographing the constantly changing life that surrounds them.

Easiest things to collect, probably, are seashells. All you need to do is comb the beach systematically, examining your finds critically and keeping only those that are not cracked or chipped. The more fragile shells should be packed in some soft material. Cotton is ideal, but if that is lacking crumpled paper will do.

Pressed specimens of land plants are easy to prepare, too. A plant press, that will do as good work as any professional botanist's equipment, can be improvised out of pieces of thin crating material and sheets of corrugated cardboard saved from empty cartons. A sheet of ordinary newspaper, folded once, is exactly the right size for the standard herbarium specimen.

If you want to pickle small fish, lizards, and some of the strange animal forms that swarm in the reef waters, you will need a supply of alcohol or formaldehyde—and these are as a rule not easy to obtain under island conditions. But if you can get them, you needn't worry about museum jars. Empty glass containers of any kind will do—pickle bottles and screw-top jars for the larger specimens, discarded medicine vials for the smaller things.

Simple manuals and guides for collectors have been prepared by a number of museums in this country; most of them can be obtained free. And if you cannot identify your specimens yourself, the museums will be glad to receive duplicate specimens and supply the names from them.

Science News Letter, September 29, 1945

CHEMISTRY

New Process Offers Uncaked Frozen Foods

➤ PACKAGES of frozen foods need not be solid bricks, as they familiarly are today. They take this form, Frank W. Knowles of Seattle states in the preamble to his patent 2,385,140, because they are put into freezing trays still covered with water from the washer, and this water sticks them together when it turns to ice. In his new process, Mr. Knowles keeps the food pieces constantly agitated, while he passes them first through a nearly saturated atmosphere where each piece becomes covered with an individual glaze of ice or frozen sugar syrup, then through a drier atmosphere where the freezing process is completed. Rights in this patent are assigned to the Beltice Corporation, of Seattle.

Science News Letter, September 29, 1945

The Alabama *flake-graphite* industry has flourished only in time of war when importations of the material, particularly from Madagascar, have been cut off or greatly curtailed.

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ve you a son or daughter interested in SCIENCE?

IF SO, ask your child to give this page to a science teacher, or scout master, or to any adult awake to the possibilities of developing young minds to scientific understanding. SCIENCE CLUBS OF AMERICA will help such a person organize a science club.

Young people use their spare time learning in these clubs, and have fun while learning. Read below the sort of intelligent fun science clubs provide; then *see that this page is given to an interested person,* so that he can send for the free, useful handbook giving information on how to organize a science club.

Andover, Massachusetts

PHILLIPS ACADEMY SCIENCE CLUB, *Elbert C. Weaver,* Sponsor. 15 members, boys. Each member has an interest of his own, such as: isolation of metallic beryllium, building a model dirigible, constructing an electric furnace, mathematical analysis of wave patterns, casting brass, preparation of explosives, making rain gauges, lens and mirror grinding, dismantling motors.

Lawrence, Kansas

JUNIOR ACADEMY CLUB, H. S., *Miss Edith Beach,* Sponsor. 11 boys, 3 girls. Their programs of demonstrations and reports on work in chemistry, testing cloth, dissection of animals, penicillin, plastics, sulfanilamide, dyes and quinoline, are open to the public. At one program each year the local Kiwanis Club awards cash prizes.

Deming, Washington

SCIENCE CLUB, Mt. Baker H. S., *Miss Dorothy Massie,* Sponsor. 68 boys, 14 girls. They have constructed for their science department the following equipment: a slide and film strip projector opaque projector, delinescope, induction coil, incubator, dehydrator, electric furnace, micro projector, photo microscope, wind tunnel, radios, code oscillator. Club does photography for the school annual and electrical repair work; gives an assembly program, holds a community open house. Some members are lab assistants. Members like to construct lab equipment because it makes science more practical and saves money for more equipment.

Port Washington, New York

RETORT CLUB, H. S., *Edward Pickett,* Sponsor. 12 boys, 5 girls. Established 16 years. They concentrate entirely on chemistry and do experiments at every meeting. They make soil tests for residents of the community to help them get fullest yields from their gardens.

Rivers, Arizona

CANAL STUDENTS OF SCIENCE, Canal Elementary School, *Miss Alice J. Marshall,* Sponsor. 35 boys. During the summer months they collect and mount insect specimens common to the southwestern desert. During the winter they experiment in the field of elementary chemistry.

Rush City, Minnesota

FSA SCIENCE CLUB, H. S., *Walter E. Mielke,* Sponsor, 11 boys, 10 girls. They took over the "deteriorating" school museum, have cleaned, rearranged, renamed and added to the collections. It is now open to students and public. Members visit places such as a cement plant, creamery, mill, an orchard to watch spraying. The Club holds a Fair featuring garden products and plant hobbies.

Boyertown, Pennsylvania

SCIENCE CLUB, H. S., *Miss Winifred Y. Moyer,* Sponsor. 20 boys. They study aviation history, make models, fly model planes, hold identification contests, display models in a downtown store window. They built an airplane model embodying the ideas of all members.

Houston, Texas

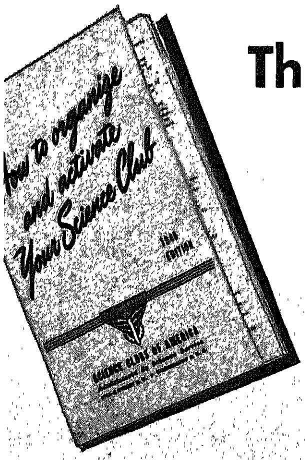
ALETHEIA CLUB, St. Agnes Academy, *Sister M. Stephana,* Sponsor. 34 girls. Because many want to be doctors, nurses or laboratory technicians, best-liked programs are on medicine, penicillin, plastic surgery, cinchona planting. They investigated the use of the Chinese tallow trees, growing well in the area, as a source of oil and soap. While this didn't prove practical on a commercial scale, they made candles from the oil, used the wood for printing blocks and the leaves for dye. The chemists they consulted while making their investigations became interested in the Club and have started them on new lines of study of other plants nearby.

Santa Maria, California

SCIENCE CLUB, H. S., *W. D. Steimle,* Sponsor. 6 girls, 12 boys. Favorite subjects: electricity, chemistry, radio, astronomy, meteorology, aeronautics. The group visited an air base meteorology station; a naval base to see dredging; a sugar refinery; and an oil well to observe drilling. The Club completed a six-inch reflecting telescope; is now constructing a seismograph. From their meteorology station they "predict" weather. Their president, who was awarded an honorable mention in the annual *Science Talent Search,* did important work in the solidification of mud.

Brooklyn, New York

SCIENCE WORKSHOP, Brooklyn H. S. of Automotive Trades, *Robert R. Peterson,* Sponsor. 10 boys. For the 3 years of its existence the Club has put on an auditorium science program each term. Members build model airplanes, repair electrical equipment for the school and for the homes. They make showcase exhibits and animate them. They put science puzzles in their showcases and offer prizes for the best solutions of them. They run the school's weather bureau and visual aid equipment. They take part in Parents' Night demonstrations. In their meetings they practice the demonstrations they give later before the school assembly.



This handbook tells how to start

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• Books of the Week •

➤ THE SOIL has long been recognized as a great reservoir of fungi; they are among the most active organisms of decay, and they invade man's domain as causes of spoilage and, occasionally, of disease. Latterly some of them have received much notice as sources of antibiotics. Useful, therefore, as well as timely, is the appearance of a new MANUAL OF SOIL FUNGI by a well-known mycologist, Joseph C. Gilman. It is a book primarily for the professional botanist, giving detailed description of all species at present known. (*Iowa State Coll. Pr.*, $5.)

Science News Letter, September 29, 1945

➤ WITH MANKIND sobering up after the greatest orgy of self-slaughter in its bloody history, and ruefully resolving to at least attempt some kind of warless international order, one of the things that can be expected is international cooperation in wildlife conservation. Coming just in time to serve as a handbook in such an effort is a thorough-going review of all known facts about the status of mammals of the Eastern hemisphere: EXTINCT AND VANISHING MAMMALS OF THE OLD WORLD, by Francis Harper. The literature has been very thoroughly searched for records of last specimens taken in any given region, and for estimates of chances of survival where any remnants of a species are left. Careful descriptions are supplemented with many text figures. (*Amer. Comm. for Internat. Wild Life Protection*, New York, $4).

Science News Letter, September 29, 1945

➤ MONUMENTS of American antiquity merit monumental treatment in their published descriptions; and one of them, at least, receives such treatment in the double volume, TIHUANACU: THE CRADLE OF AMERICAN MAN. The author, Prof. Arthur Posnansky of the University of La Paz, has devoted years to the broadest possible study of the ruins of this ancient culture center on the shores of Lake Titicaca, and he has set forth his facts and opinions with greatest care, garnished his pages with sumptuous illustrations. The book is bilingual, with the English translation and the Spanish original in parallel columns. (*J. J. Augustin*, $25).

Science News Letter, September 29, 1945

➤ MANY BOOKS about weapons have come out in the past half-dozen explosive years; one of the best of them, for persons unversed in the technicalities and complexities of modern ordnance, is PRINCIPLES OF FIREARMS, by Charles E. Balleisen (*Wiley*, $2.50). It assumes no knowledge whatever on the part of the reader, and tells the whole story from the beginning in the simplest and plainest English. All the illustrations are diagrams of a corresponding simplicity.

Science News Letter, September 29, 1945

THE SCIENTIST IN ACTION
by W. H. GEORGE
A SCIENTIFIC STUDY OF HIS METHODS

This book is for those who need to do ORIGINAL thinking, CLEAR thinking, THINKING WITH A PURPOSE. Helps you to DISCOVER ideas, tells you how to DEVELOP them! Explains clearly METHODS OF WORKING to get RESULTS.

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Most respectfully yours,
H. G. Wells

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➤ THE WAR may be over, but we have by now surely learned prudence; we shall keep our powder dry and our sighting eye in trim. For peacetime training of new marksmen, as well as for the improvement of veterans' shooting, there is a timely and useful book, PRACTICAL MARKSMANSHIP, by M. M. Johnson, Jr., well-known expert-at-arms. (*Morrow*, $2.50).

Science News Letter, September 29, 1945

➤ ANIMALS, and particularly what animals do and why they do it, are the subject of Ruth Crosby Noble's THE NATURE OF THE BEAST (*Doubleday*, $2.75). Instincts, emotions, intelligence and its testing, animal play, mating behavior and home-making are among the subjects discussed.

Science News Letter, September 29, 1945

• Just Off the Press •

AMERICAN AIR NAVIGATOR—Charles Mattingly—*Ziff-Davis*, 229 p., illus., $6. A training text for instructional purposes and a reference source for professional navigators.

THE FORTRESS ISLANDS OF THE PACIFIC—William Herbert Hobbs—*J. W. Edwards*, 186 p., illus., $2.50.

HOW A BABY GROWS: A Story in Pictures—Arnold Gesell—*Harper*, 77 p., $2. Over 800 photographs arranged and interpreted with the assistance of Katherine Gesell Walden.

THE LIFE HISTORY OF AN AMERICAN NATURALIST — Francis B. Sumner — *Cattell*, 298 p., $3.

MINERALS OF MIGHT—William O. Hotchkiss—*Cattell*, 206 p., $2.50. A history of minerals and their influence on civilization.

NAMES ON THE LAND—George R. Stewart——*Random House*, 418 p., $3. A historical account of place-naming in the United States.

NEW DIRECTIONS IN PSYCHOLOGY—Toward Individual Happiness and Social Progress—Samuel Lowy—*Emerson*, 194 p., $3.

PEGUCHE, CANTON OF OTVALO, PROVINCE OF IMBABURA, ECUADOR — Elsie Clews Parsons—*Univ. of Chicago Press*, 225 p., illus., $3. A study of Andean Indians. Ethnological Series, University of Chicago publications in Anthropology.

THE RIVER MATHEMATICS—A. Hooper—*Holt*, 401 p., illus., $3.75. A history of the development of mathematical ideas and processes over thousands of years.

Science News Letter, September 29, 1945

OFFICIAL STORY of the ATOMIC BOMB!

The epoch-making report on ATOMIC ENERGY prepared for the War Department gives the full and detailed information that everyone needs to understand the facts and implications of this important scientific development.

Science Service has issued as the September number of CHEMISTRY magazine the essence of this now famous Smyth report. It is an illustrated handbook of new facts about chemistry.

This 68 page publication will be supplied for 25 cents, postpaid.

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For the 25 cents enclosed send me the September issue of CHEMISTRY devoted to the atomic energy report.

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PHYSICS

Atom Bomb Benefits

Can be reaped right away, without waiting for atomic power. Will flow from new engineering principles, new equipment and new methods.

➤ AMERICAN industry and science can begin reaping the benefits of large-scale atom-splitting right now, without having to wait for the development of atomic power, A. L. Baker, general manager of the Kellex Corporation of Oak Ridge, Tenn., declared at a press conference in New York. These benefits will flow from the new engineering principles, new equipment and new methods which had to be used under the forced draft of war to produce the atomic bomb in time for use as a weapon.

Some of the beneficial by-products of the work on large-scale atom-splitting enumerated by Mr. Baker are:

Cheaper, more abundant sources of radioactivity for the treatment of cancer.

Improved methods for combating industrial hazards due to presence of poisonous substances.

High-vacuum, low-temperature dehydration of foods.

Improvements in vacuum distillation for the production of vitamins.

Better heat exchangers, new methods of separating gasoline fractions and more efficient mass-spectrum analysis for the petroleum industry.

New electronic techniques in high vacua for the electrical industry.

More efficient gas pumps; some of these, developed for this project, can deliver a stream of gas at a velocity greater than that of sound.

All told, about 5,000 new and improved products and procedures are now available to American industry, awaiting only governmental release for volume production, Mr. Baker stated. He especially emphasized the improvements that have been made in pumps, and declared that in 20 years the benefits accruing from this one source alone would probably be worth the outlay of $2,000,000,000 made by the government for the whole atomic bomb project.

Science News Letter, September 29, 1945

AERONAUTICS

New Advanced Plane For Private Flying

➤ WITH deliveries expected to be made soon, Stinson's new four-place Voyager 150 will be among the first postwar personal planes in the $5,000 bracket to take to the air.

Typical of America's new peacetime light planes, the Voyager's 150 horsepower Franklin air-cooled engine makes possible top speeds of 133 miles an hour, 14,000 foot service ceiling, rate of climb at 770 feet a minute and a range of 500 miles at 125 miles per hour.

Capable of landing on a 230 foot field, it has complete contact flight instruments so arranged that additional instruments may be installed by those who contemplate night flying or flights solely by instrument.

A recent survey made of private plane operators indicate that among the additional instruments mostly in demand are two-way radios, directional gyros, drift indicators and turn and bank indicators, as well as audible stall warnings, level flight and flap adjustment instruments.

With more planes in the sky, the next few years will probably see less of the "hit and miss" prewar flying and private plane owners, operating under strict navigation regulations, may be under constant control of ground stations.

Science News Letter, September 29, 1945

ENGINEERING

Automotive Council To Be Dissolved

➤ THE AUTOMOTIVE Council for War Production, after nearly four years of activity in the war effort, will soon be dissolved, it is announced by Alvan Macauley, its president. The reason is that the need for this voluntary organization of 654 manufacturing companies no longer exists now that the war is over.

This organization was created soon after Pearl Harbor to pool the mass-productive know-how of all the American manufacturers of motor vehicles, together with makers of trailers, bodies, automotive parts and accessories, and the major producers of automotive tools and dies, jigs and fixtures, and special purpose machinery.

At the time of the organization of the council it was agreed to dissolve when the war was over. It was created, according to Mr. Macauley, "for the purpose of arming our country more effectively for its deadly competition with the Axis enemies.

"We pledged," he said, "that the total productive power of this competitive industry would be applied, on a voluntarily cooperative basis, to the huge task of winning the war as quickly as possible."

Science News Letter, September 29, 1945

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⚙ *CAMERA SUPPORT, worn on top of the head under a hat, permits taking of secret pictures. The hat has a hole in front of the lens, and the cord to snap the camera extends to the lapel of the coat. The support holds the camera so that it is focussed on the same object as are the eyes of the user when looking directly at the object.*

Science News Letter, September 29, 1945

⚙ *LADY'S HANDBAG has at its bottom a long cylindrical compartment of a stiff material, long enough and big enough to hold a modern full-sized closed umbrella. The umbrella is inserted in one end of the bag through a circular opening, which is fitted with a neat unnoticeable cover.*

Science News Letter, September 29, 1945

⚙ *ELECTRIC FAN, that "spirals" the air forward as in a miniature tornado, more than doubles air delivery and air movement over conventional straight-line draft fans. An injector-cone housing of the fan blades and motor imparts the swirling action.*

Science News Letter, September 29, 1945

⚙ *LOW PLATFORM on a propelling track assembly, similar to that of a tank, is just large enough to carry forward in battle a single soldier lying on his stomach. It is powered by a small motor between the soldier's feet.*

Science News Letter, September 29, 1945

⚙ *WINDOWS may be strips of plate glass arranged like the familiar Venetian blind, but which will not raise or lower. The strips can be turned at an angle to admit air, and closed tightly to exclude cold and rain. Lower louvers in the window pictured are of chipped glass to assure privacy.*

Science News Letter, September 29, 1945

⚙ *GARMENT-protecting hangar consists of a stiff paper back with a strip of wood at the top, on which an ordinary hanger is suspended, and two paper wings that fold over the front to complete the enclosure. Top projecting pieces on the wings fold over the wooden strip to keep out dust and dirt.*

Science News Letter, September 29, 1945

⚙ *CARGO container, that floats slowly to earth from an airplane without a parachute, is a one-foot square box 34 inches long with collapsible rotors, or wings, on two sides which open out when the package is dropped. The wings are so pitched that the box rotates as it falls.*

Science News Letter, September 29, 1945

⚙ *PROTECTIVE SHIELD, to be worn over the shoulders by patrons in beauty parlors, has a suspended bib with pockets on the front. The pockets are for the convenience of the operator, to hold such accessories as curlers and combs. Shield, bib and pockets are made of a water-resistant fabric.*

Science News Letter, September 29, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 278.*

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Question Box

BIOCHEMISTRY

What new germ-stopper has been found in Chinese water-chestnuts? p. 200.

CHEMISTRY

How is it possible to have uncaked frozen foods? p. 204.

What new method is offered for obtaining sulfur? p. 200.

What well-known adhesive can be made to bounce like rubber? p. 199.

HERPETOLOGY

How far do Florida turtles travel at a time? p. 201.

MEDICINE

How successful has streptomycin been for TB so far? p. 195.

What are the advantages of penicillin mist inhalations? p. 198.

What is believed to be the cause of high blood pressure? p. 196.

What new use has been found for colchicine? p. 198.

ORDNANCE

What detonator weighs only 2.8 grains? p. 197.

PHYSICS

How soon can the benefits from atom-splitting be reaped? p. 207.

Where published sources are used they are cited.

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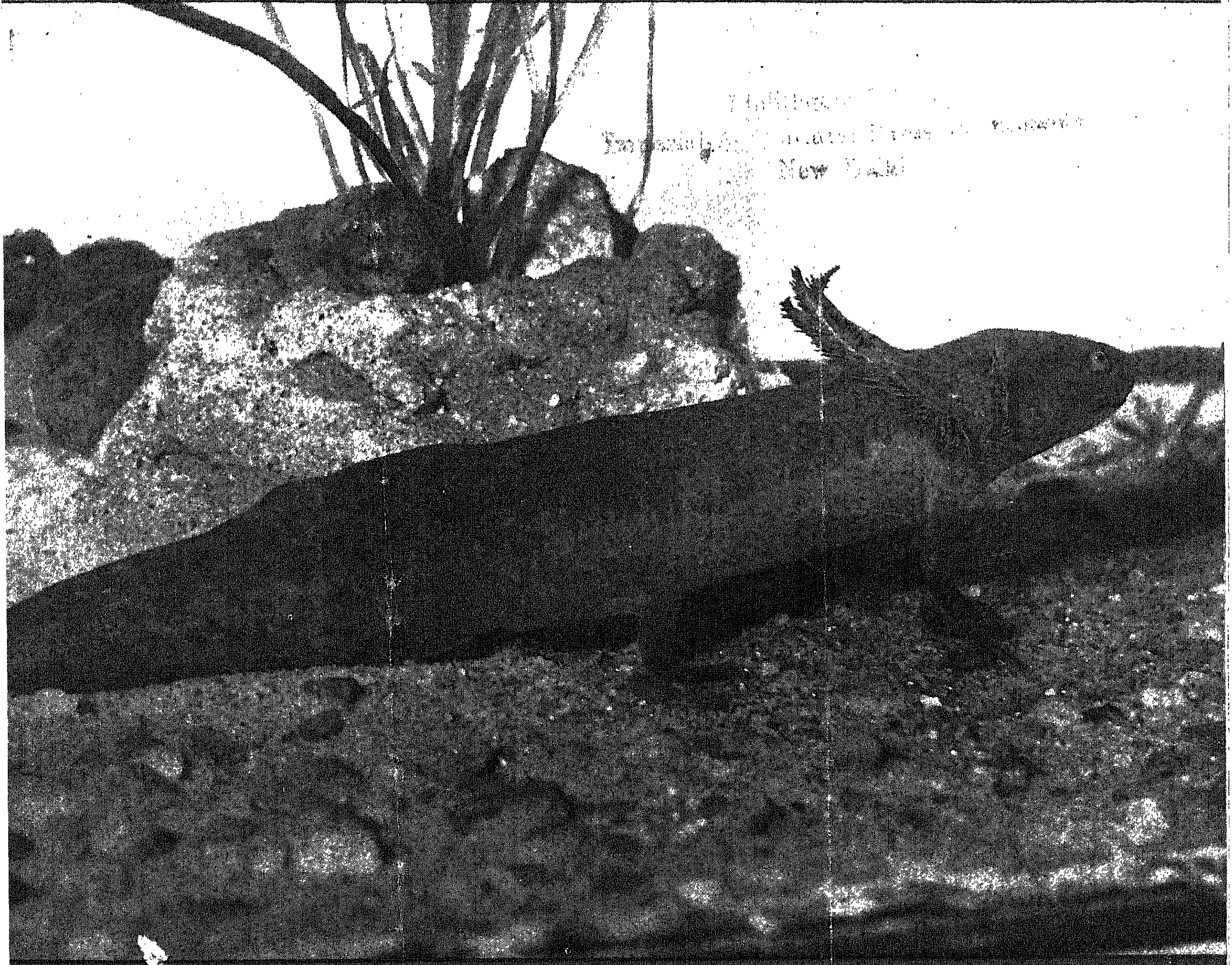
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • OCTOBER 6, 1945



[illegible] New Delhi

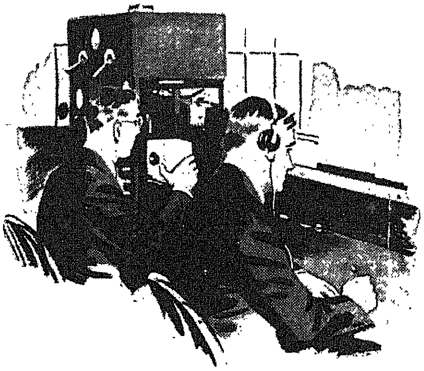
Axolotl

See Page 212

A SCIENCE SERVICE PUBLICATION

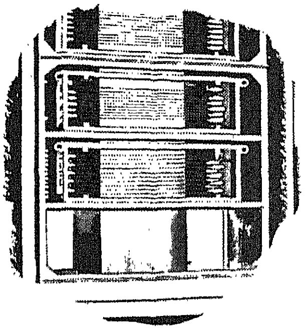
he started something that will never stop

25 YEARS AGO a Westinghouse research engineer started something that was destined to have a profound effect upon the lives of all of us . . . and upon generations yet unborn. That *something* was *radio broadcasting.*



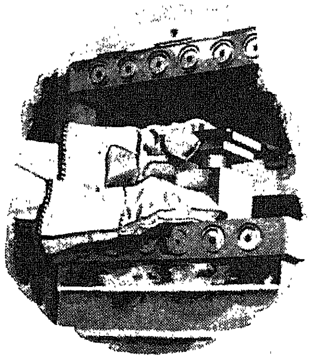
Radio broadcasting was born

on November 2, 1920, when the Presidential Election returns were broadcast from the tiny radio station, KDKA – built by Dr. Frank Conrad at the Westinghouse plant in East Pittsburgh, Pa. It was the first *scheduled radio broadcast* in history . . . the forerunner of a world-wide network that would eventually carry enlightenment and entertainment to the far corners of the earth.



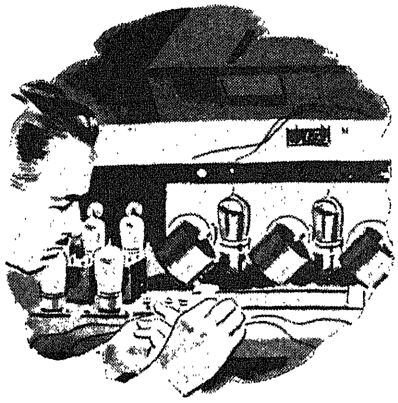
Another "first"

by Westinghouse was the use of radio waves to fuse a mirror-like finish on dull electrolytic tin plate. High-frequency induction heating now helps make *one pound* of war-scarce tin do the work of *three.*



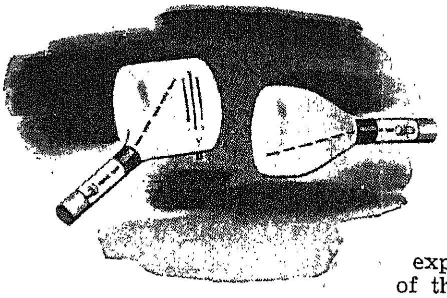
Dielectric death

. . . administered to weevils in grain elevators . . . is another example of the ingenuity of Westinghouse high-frequency engineers. Westinghouse dielectric heating equipment is today speeding the bonding of plywood and curing of plastics and synthetic rubber.



Frequency modulation

was pioneered by Westinghouse scientists as far back as 1920. At that early time they experimented with high frequencies that led the way to the static-free, crystal-clear FM we know today.



Television

has become a reality because of the genius of Westinghouse micro-wave experts, who developed the forerunner of the Iconoscope in 1923 and the Kinescope in 1929. These devices banished forever cumbersome scanning discs.

Research in microwaves

never stops at Westinghouse. Research, begun 20 years ago, resulted in the key electronic tube for the *first* long-range Radar equipment. Other secret devices, born of war in the Westinghouse Research Laboratories, will contribute to a better, brighter peacetime world.

Westinghouse

PLANTS IN 25 CITIES · OFFICES EVERYWHERE

CHEMISTRY

Can Kill 300,000 Rats

ANTU, powerful poison, developed from taste tests in psychology laboratory. War restrictions lifted, will soon be available. Not dangerous to humans.

➤ ANTU, a rat poison so powerful that one pound could kill 300,000 rats but which is not dangerous to humans, will soon be available to the public.

Discovered through taste tests in a psychology laboratory, ANTU has been a closely guarded secret during the war. First inkling that security restrictions had been lifted came with publication in the U. S. Public Health Service's *Public Health Reports* of a scientific study by Drs. Wm. T. McClosky, M. I. Smith and R. D. Lillie of the National Institute of Health.

Credit for the discovery of ANTU as a rat poison, however, goes to Dr. Curt P. Richter, of the Phipps Psychiatric Clinic at Johns Hopkins Hospital in Baltimore.

The word ANTU is made of the initial letters of the rat poison's chemical name, alpha-naphthyl thiourea. It is a fine gray powder with very little odor or taste. Compared to other rat poisons, ANTU turned out to be twice as poisonous as thallium sulfate and more than 100 times as poisonous as arsenic trioxide and fortified red squill on the basis of the sizes of the killing doses of each.

ANTU has two remarkable features. 1. It acts almost exclusively on rats, leaving humans and most other species unharmed. 2. It kills rats in an unusual way, causing a dropsy of the lungs so great that the animals are drowned in this fluid from their own bodies. It is the only substance known to produce an edema, or dropsy, that is limited to the lungs.

For rat eradication, ANTU can be used mixed with finely ground corn or wheat; as a spray or dust on fruit or vegetables such as cut-up apples, sweet potatoes, tomatoes, and the like; as a dust, either pure or mixed with flour, on floors and runways; as a dust on the surface of water where rats are likely to drink; or blown as dust into rat holes and burrows with standard dust pumps used in rat eradication.

Large scale field trials in Baltimore showed that it can produce results very rapidly when properly used. In an emergency, such as an epidemic of rat-borne disease like typhus or plague, probably 95% or more of the rat population of a city could be wiped out in 24 to 48 hours, providing a supply of material and trained personnel were available.

The Baltimore trials also showed that ANTU must be used systematically to be effective. Rats that do not get enough of the poison to be killed outright grow wary about sampling ANTU-poisoned bait another time. The bait must carry enough poison and enough of it must be used to get every rat in the region at one time.

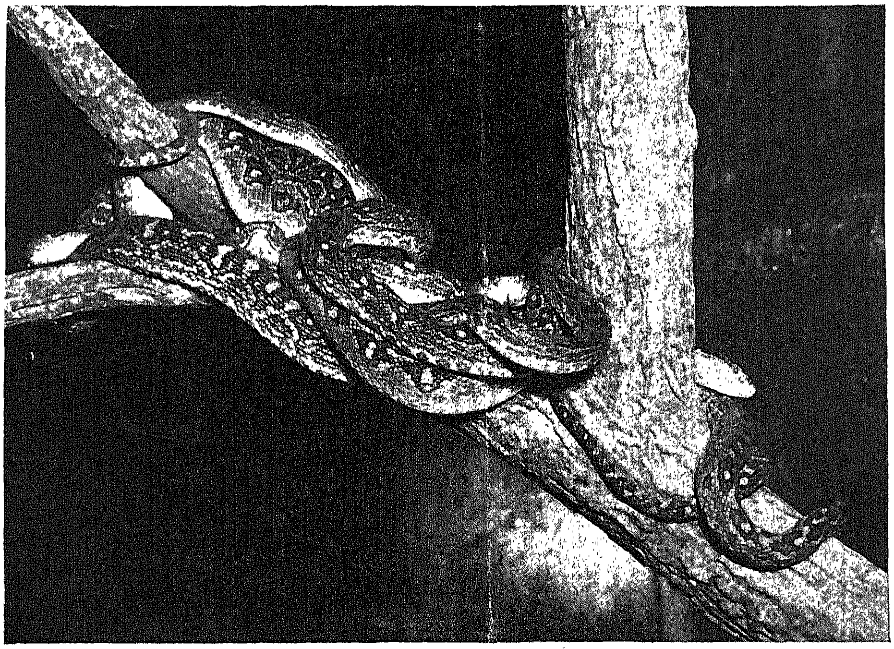
Dr. Richter recommends the city block as the smallest unit for rat eradication with ANTU, because, while rats move from yard to yard within a block, they rarely cross one of the streets to the next block. Complete coverage, with every rat hole, burrow and runway in every building, cellar and yard within the block containing adequate amounts of ANTU, is essential to success. So also is the cooperation of householders in the area. A preliminary clean-up of the block or area and use of alternate baits were also found important.

ANTU might be used to get rid of mice although it is less effective against these than against rats. Dogs may be poisoned by it and some were accidentally killed during the Baltimore campaign, although none of the more than 500,000 residents who had contact with ANTU were even made sick by it. Rabbits are not affected and chickens can be fed ANTU by the spoonful without harm.

Dogs, fortunately, are pretty well protected against ANTU poisoning by the fact that it causes them to vomit and so get rid of the poison. This and the fact that the chemical is almost insoluble furnish a guide to treatment of humans if any should ever be poisoned by it. No antidote has yet been discovered but immediate washing out of the stomach is advised by Dr. Richter. No fluids should be given. Dr. Richter also advises giving oxygen in case of ANTU poisoning.

ANTU was discovered as a result of studies Dr. Richter had been carrying on before the war, with no idea of developing a rat poison. He was working on the problem of taste as a guide to selection of food, seeking answers to questions such as why some persons develop an abnormal craving for salt or other diet items.

Rats were used in the studies and Dr. Richter found that these animals could



FROM OKINAWA—These "habu" snakes, patterned in yellow and green, are now at the National Zoological Park in Washington, D. C. Photograph by Fremont Davis, Science Service staff photographer. (See next page.)

select nourishing foods and avoid poisonous substances so long as their taste nerves were intact and functioning.

One afternoon he gave the rats a chemical often used for taste tests in humans. This is phenyl thiourea, which tastes very bitter to most persons though some cannot taste it at all. As is done in the tests on humans, a few crystals of the chemical were put on the tongues of rats.

All the rats in the test were dead the next morning. This was a surprise, because phenyl thiourea previously had been considered non-poisonous. It had been safely used for a long time for taste and inheritance studies in large numbers of people.

The war value of this discovery was immediately apparent. Red squill, which is imported, was no longer available and other rat poisons were either in short supply or dangerous. At the same time, the danger of epidemics of typhus fever and other rat-borne plagues might increase during the war. So, at the suggestion of Col. Perrin Long, Dr. Richter continued to study phenyl thiourea under a grant from the Office of Scientific Research and Development.

He soon found that although the rats in his laboratory would eat enough of the chemical in their food to poison themselves, wild rats in the city dumps and grocery stores of Baltimore were more wary. Apparently the bitter taste of the chemical warned the rats or at least kept them from eating bait poisoned with it.

A search for related chemicals was made with the help of the E. I. duPont de Nemours Company who quickly supplied over 100 chemicals. Of these, alpha-naphthyl thiourea turned out to be the best. It is made from alpha-naphthyl amine and ammonium thiocyanate. These chemicals, commonly used in the dye industry, are not expensive and were not on the list of critical chemicals during the war.

When first supplied, ANTU carried traces of a perfume made in the same building. This doubtless was a pleasing odor to the chemical company's human customers. To the rats, however, it evidently stank and they would have none of it. This difficulty was overcome and ANTU was put into large scale field trials.

Hundreds of thousands of residents of Baltimore, although ignorant of the identity of this new rat poison, soon were gratefully aware of its power to rid their premises of rats.

Surprising and somewhat disappointing was the discovery that while ANTU is very poisonous to the Norway rat, the Alexandrine or black rat commonly found in many parts of the world is not as much affected by the poison.

Science News Letter, October 6, 1945

ZOOLOGY

Snakes from Okinawa

They are now at the zoo in Washington. Called "habu" they are long and slim, patterned in yellow and green. Small collection of axolotls is also recent acquisition.

See Front Cover

➤ POISONOUS snakes from Okinawa, 20 of them, long and slim, patterned in yellow-and-green, are at the National Zoological Park in Washington, D. C. The Okinawan name for them is "habu". They belong to the pit-viper family, which makes them kin to the American rattlers and copperheads, rather than to the Old World cobras.

Director William M. Mann states that they are rather quiet and unaggressive, "though they do offer to snap at you once in a while." In their native haunts they are sub-arboreal in habit, which means that they are rather fond of slithering around in the branches of trees. When annoyed they have a way of puffing out their throats, like pouter-pigeons or bullfrogs.

They have been here at the Zoo for several weeks, but until now their presence was held as restricted information, at the request of the Army Medical Corps, which brought the specimens to Washington.

Another recent acquisition at the National Zoological Park is a small collection of Mexican axolotls. One of these is shown in the photograph by Fremont Davis, Science Service staff photographer, on the front cover of this Science News Letter. These are six-inch-long salamanders in a permanently arrested state of development. Unlike normal salamanders, which begin life as larvae in the water but eventually emerge to live on land in damp places, axolotls retain a larval form all their lives, breathing with external gills and never developing lungs.

Science News Letter, October 6, 1945

Black, blue, and other colors in *diamonds* are due to impurities.

Electronic blanching of vegetables, or using a shot of high frequency electricity instead of the flowing steam or boiling water method, results in retaining in cabbage 10 times the amount of vitamin C as in the older method.

SCIENCE NEWS LETTER

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ENGINEERING

Attacks 1,000 Homes Daily

Fire Prevention Week is designed to focus attention on the seriousness of fire losses and the simple precautionary measures to prevent them.

➤ EVERY DAY in the United States 1,800 fires take 28 lives. Fire, practically always caused by carelessness, daily attacks 1,000 homes, 130 stores, 100 factories, eight schools, seven churches and three hospitals.

In the last 12 months property destroyed by fire in the United States exceeded the damage done in England during the first two years of the German blitz.

Fire loss in the United States is the highest in the world, averaging $4 per capita, compared with a normal loss in England of less than $1, and less than 50 cents in Germany.

During the last decade in the United States a hundred thousand persons have burned to death. A hundred and seventy thousand have been burned and disfigured by fire. Three billion dollars worth of property has gone up in smoke. Six million fires have occurred.

At the present rate, the U. S. fire loss in 1945 will exceed $450,000,000, plus a human toll of some 10,000 lives. Fire Prevention Week, Oct. 7 to 13, is designated by proclamation of President Truman and the state governors to focus public attention on the seriousness of fire losses and the simple precautionary measures to prevent fires.

Fully 50% of all home fires could be prevented if proper construction and fire-resistant materials were placed at strategic points in the building of new homes or remodelling of old ones, estimates Percy Bugbee, general manager of the National Fire Protection Association of Boston, which for 50 years has been crusading to reduce the tragic yearly loss in the United States from fires.

With the tremendous volume of remodelling and new construction soon to begin, there are eight principal features of fire-safe construction which builders and home-planners should consider:

The heating plant should be properly constructed and installed, with adequate safeguards in the use of fire-resistant coverings on pipes, walls and ceilings of the room in which the heating plant is located.

Wiring must be safe and adequate, properly installed in the walls, and have sufficient outlets. The wiring circuit should be heavy enough to carry the electric load needed in modern homes.

Use fire-resistant roofing material such as asphalt shingles or similar protective covering which will resist wind-blown sparks and firebrands. Sparks falling on flammable wood roofs stand third among the major causes of home fires, and roof-communicated fires from sparks is the principal cause of conflagrations.

Be sure the chimney is properly constructed of sound masonry or brick, with the foundation of the chimney on the ground and not suspended on timbers. This is especially important in farm homes and low-cost housing, where chimneys frequently rest on timbers.

Adequate fire-stops should be built in concealed space within sidewalls and interior partitions, especially on the first floor. These fire-stops will keep the walls from becoming flues through which a fire starting in the basement or first floor can be sucked up through the whole house. The deep recess of closets under stairways also should be completely finished off to prevent a blaze spreading rapidly and engulfing the stairs, thus trapping people on the second floor of a burning building.

Place a strong door at the entrance from the basement into the house to serve as a fire-stop if a blaze starts in the basement or furnace room.

Basement ceiling should be plastered or covered with a fire-retardant material, and not left with joists and the underside of flooring exposed.

Use non-combustible, fire-retardant materials on the interior walls rather than combustible material that is easily set afire. In the opinion of the National Fire Protection Association, one of the most serious hazards in home construction is the use of combustible interior finish.

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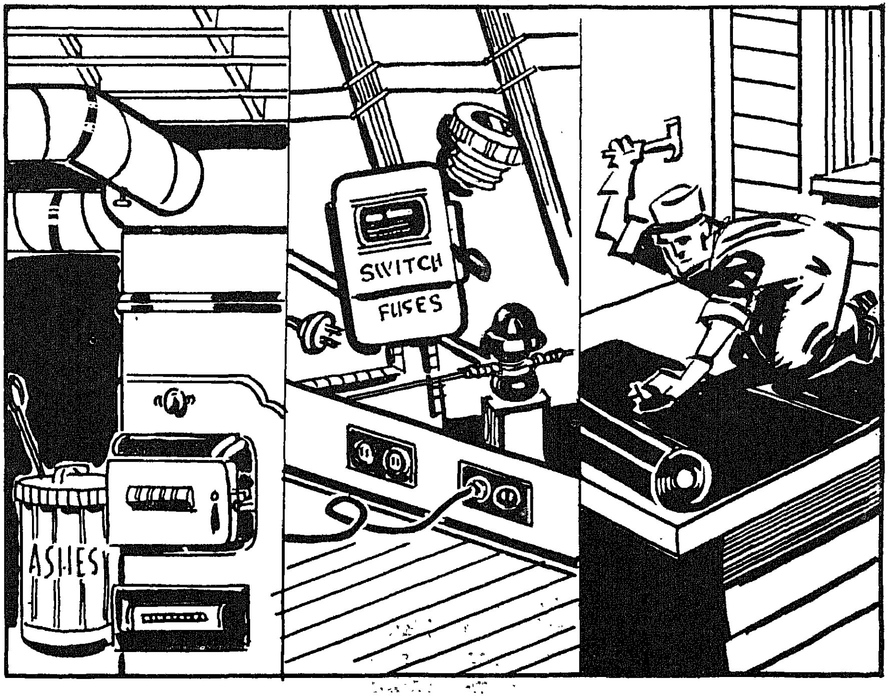
The grub of the *Japanese beetle* consumes grass roots as its principal food; the adult beetle feeds on a wide variety of plants, including certain fruits, ornamentals and vegetables.

A *blue frog* on exhibit in the Philadelphia zoo belongs to a family of green frogs, and is blue because, by a freak of nature, it lacks yellow pigment cells in its skin; the yellow and blue together would give green.



PREVENT FIRES—Home fires could be halved in number if properly constructed and fire-resistant materials were placed at strategic points in the building. Important among the features for fire-safe construction are the heating plant, wiring, and fire-resistant roofing material.

ORDNANCE

Proximity Fuze

The VT fuze for the Navy five-inch antiaircraft shell is one of the war's best kept secrets and ranks a close second in hastening the war's end.

➤ THE PROXIMITY fuze, a tiny radio set device in the nose of a projectile, is rated as the U. S. A. No. 2 secret weapon. Its use in antiaircraft fire directed at Jap suicide bombers, in artillery barrages in the famous Battle of the Bulge in France and in neutralizing Nazi buzz bomb attacks on London, is credited with a major help in winning both the European and Pacific wars.

The VT or variable time fuse, as it is also called, explodes a projectile as soon as it comes close enough to a target to inflict damage.

Along with the atomic bomb, the proximity fuse was one of the best kept secrets of the war. For two and a half years of war, projectiles and bombs fuzed with this proximity device inflicted terrific damage on the enemy. The only clue to its existence was what appeared to be unprecedented accuracy of gunfire; it was really a device that caused devastating destruction in spite of slight unavoidable inaccuracies in aim.

The VT fuze was developed by scientists of the Office of Scientific Research and Development at the request of the Navy Bureau of Ordnance. The research program was carried on in facilities provided by the Carnegie Institution of Washington and the Johns Hopkins University.

A record was set by its rapid development from an idea in the minds of ordnance experts to a triumph of quantity production. Research began in August, 1940, and 400 fuzes per day were coming from the assembly lines in September, 1942. By the end of 1944, the daily production was more than 40,000 in the factories of the five firms which did the assembly job. The price was gradually and rapidly reduced from $40 to $18 per fuze.

The VT fuze is an extremely rugged five-tube radio sending and receiving station which fits into the nose of a projectile. The heart of this miniature radio station is a vacuum tube which sends out electro-magnetic waves or impulses at the speed of light—186,000 miles per second. The impulses are reflected back to the tube by any target that gives a radio reflection, such as metal objects, water or earth.

The fuze works on the same principle that causes a train or fire engine whistle to sound higher in pitch as it approaches. The frequency of the electric signals sent out by the fuze is kept constant, but as the shell approaches its target, more impulses per second are reflected by it back to the fuze, the frequency increasing in proportion to the speed of both shell and target. The fuze can, of course, be set to work the detonator at any frequency necessary to insure destruction of the approaching target.

If a VT-fuzed projectile, in flight, passes within 70 feet of an airplane, reflected impulses act on the fuze circuit to trigger a switch. The switch causes an electrical detonator to set off the main explosive charge in the projectile.

The VT fuze has tremendously simplified the task of the men behind the five-inch guns, the Navy's principal long-range antiaircraft weapon. Before the VT fuze was created, time fuzes were used in 5-inch shells to obtain destructive air bursts. But time fuzes required not only that the time of flight from gun to target be calculated accurately, but that each fuze be "set" for this time. A slight error in fuze-setting could cause the shell to explode at a harmless distance from the target.

Use of the VT fuze eliminates fuze-setting, excludes errors inherent in time-fuze mechanisms, and makes possible maximum results at the split second speed demanded by modern antiaircraft fire. A VT-fuzed projectile explodes automatically when it reaches a point where its fragments can shower a target. When the gun is properly directed, all a gun crew has to do is load and fire.

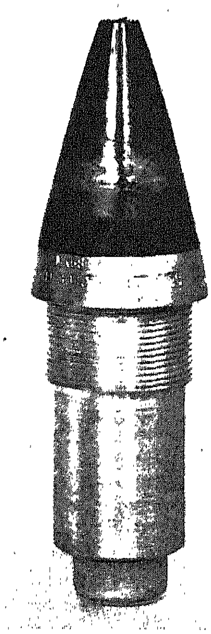
The threat of the airplane to the surface ship stimulated the search for a practical proximity fuze. In the summer of 1940, the Navy pushed the development of such a device, requesting the National Defense Research Committee, a research division of the Office of Scientific Research and Development, to begin research on various types of proximity fuzes. The actual research program was carried out by a section of NDRC, headed by Dr. Merle A. Tuve, of Chevy Chase, Md., chairman of the scientific group which brought the difficult research problem to a successful conclusion.

The importance of proximity fuzes for high velocity shells launched Dr. Tuve's section immediately on the development of vacuum tubes and other miniature electronic parts so rugged that they could withstand the shock of being fired from a gun with a force of 20,000 times that of gravity and the centrifugal pressure created by projectile rotations as high as 475 a second. The components had to be so small that a complete radio transmitter-receiver, with amplifier and power supply, could be installed in the nose of a projectile. Photoelectric triggering devices were the first to be successful, but circuits based on radio reflection were later adopted as the most effective for the purpose.

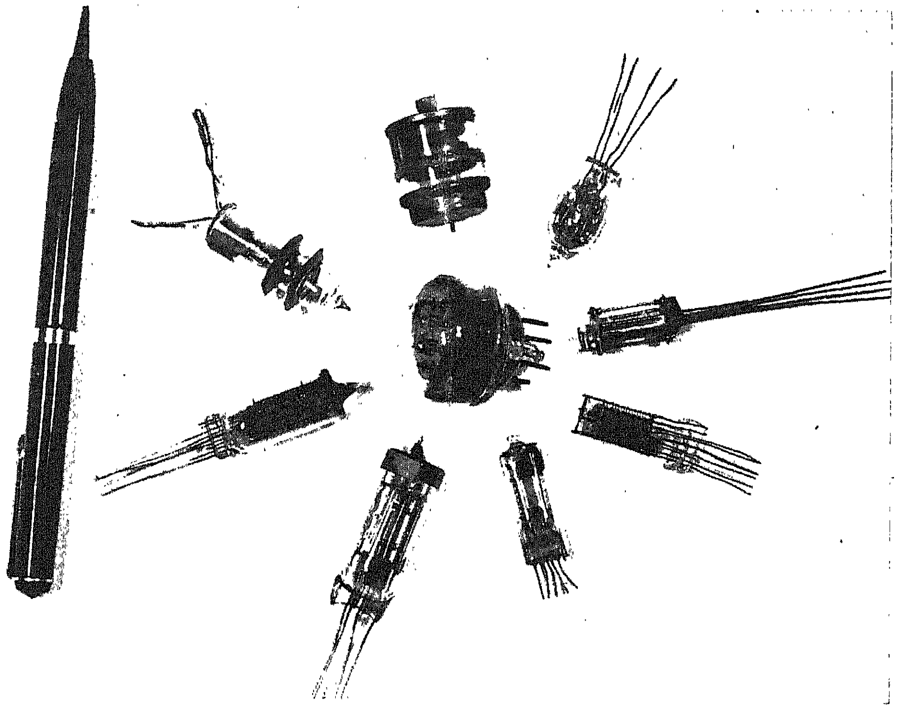
Large scale production of a peculiarly complex device was a marvel of production skill. Assembly operations were carried on by five companies—Crosley Corporation, Sylvania Electric Products, Inc., Radio Corporation of America, Eastman Kodak Company, and McQuay-Norris Manufacturing Company. A total of 87 different firms using 110 different factories were engaged in some phase of production work.

Science News Letter, October 6, 1945

The *wood bison* is larger, darker in color, and shaggier than the bison found on the Plains.



DESTRUCTIVE!—This fuze weighs 1.9 pounds and is 7.5 inches long. It is used in the three inch Navy shell.



PINT-SIZED—This fuze, holding its own five-tube radio sending and receiving set, explodes a projectile as soon as it comes close enough to a target to inflict damage.

CHEMISTRY

Gas Attacks Anticipated

Soldiers were equipped with the latest type of gas masks, protective coverings, protective ointment and special eyeshields.

➤ NO SERIOUS attempts were made by either the Nazis or the Japs to use gas against American troops during the war, but if they had, relatively little harm would probably have resulted because the American forces at all times, wherever located, were fully prepared for large-scale gas attacks. Details of protective methods adopted are now revealed by the Army Chemical Warfare Service.

Soldiers were equipped with the latest types of gas masks, protective coverings, protective ointment and special eyeshields. Decontamination companies of the Chemical Warfare Service were ready with vehicular and portable equipment to clear the way through contaminated areas by chemical neutralization or other scientific means.

Gas masks, perhaps, come first in the individual protective devices. They purify the air the wearers breathe and also protect eyes and faces. The canister is the gas mask's most important part if the mask is properly fitted to the face. It is a metal container through which the wearer inhales. He exhales through an outlet valve near his mouth. Inhaled air passes through a filter in the canister that removes microscopic particles, poisonous or otherwise, and then through layers of activated charcoal which absorb remaining molecules of irritants.

Since adsorbent charcoal can soak up only a given quantity of poisonous molecules before becoming saturated, no military mask will afford indefinite protection in heavy concentrations. The standard canister will not protect against certain industrial gases such as carbon monoxide, ammonia, hydrocyanic acid and oil vapors, but will protect against all toxic gases likely to be used in war.

Protective covering is a cellophane cover designed to protect individual soldiers against blister gas sprayed from the air. It is an envelope large enough to cover a crouching man and his pack. The top part is transparent. It is very light in weight, and occupies, when folded, very little space. In use the soldier punches a hole through its side through which he sticks his rifle. It is discarded after being used.

The protective ointment issued the soldiers is in a tiny kit and is spread on all exposed skin of the body. It prevents injury from a gas, and can also be used as first-aid treatment and for decontamination of personal equipment.

The special eye shields are stamped out of a clear, flexible plastic, and protect the eyes from blister gases and toxic agents. Four were issued with each gas mask. Held by an elastic band around the head, they can be worn in an alert position on the forehead like an eyeshade, or pulled down on the bridge of the nose in the ready position.

Science News Letter, October 6, 1945

ELECTRONICS

Electrical System Defects Shown in Flight

➤ A PROJECTED image on a screen showing defects in the electrical system of aircraft engines is one of the outstanding features of the new ignition analyzer developed by D. Napier and Son and the English Electric Company.

About the size of a portable typewriter, the analyzer, taking power from 220 volt A. C. mains or a 6, 12 or 24 volt accumulator, may be adapted as a permanent instrument on multi-motored planes. Peaked figures on the screen, one for each spark plug, arranged in the firing order of the engine, remain unchanged in shape and intensity when the ignition system is functioning properly, but flicker and alter shape in direct ratio to defects in corresponding spark plugs.

Easily diagnosed by visual characteristics of the fault, excessive spark gaps give a high figure, short-circuited gaps a correspondingly low figure, while an occasional miss shows instantly as a definite flicker. Defects in the magneto or distributor alter the entire row of figures as a unit.

By locating and diagnosing minor defects, dormant until the moment of breakdown, this tester can minimize loss of flying time and aid maximum engine efficiency. Operated in flight, potentially serious engine failure due to faulty ignition may be revealed, giving the pilot adequate time to find suitable terrain should a forced landing be necessary.

Science News Letter, October 6, 1945

Less *sugar* is required in a cake if dried fruits are used as filling.

GENERAL SCIENCE

Hearings on Science Bills To Begin Oct. 8

➤ LEADING scientists, industrialists, labor leaders and government officials will urge increased Government support of scientific research in joint hearings before the Senate committees on military affairs and commerce for three weeks beginning Oct. 8.

Following President Truman's message asking for a single federal research agency for scientific research, joint hearings have been arranged for the Kilgore-Johnson-Pepper, Magnuson and Fulbright bills.

Those who have been invited to appear during the first week are: President Isaiah Bowman, Johns Hopkins University; President James Conant, Harvard University; Dr. Harlow Shapley, Harvard University; Eric Johnston, U. S. Chamber of Commerce; Ira Mosher, National Association of Manufacturers; William Green, American Federation of Labor; Philip Murray, Congress of Industrial Organizations; Edward O'Neal, Farm Bureau Federation; Charles Goss, National Grange; James G. Patton, National Farmers Union; Dr. Vannevar Bush, Office of Scientific Research and Development; Harold D. Smith, Bureau of the Budget; Secretary Robert P. Patterson, War Department; Secretary James V. Forrestal, Navy Department; Dr. Jerome C. Hunsaker, National Advisory Committee on Aeronautics; Secretary Henry A. Wallace, Department of Commerce; Secretary Harold L. Ickes, Department of Interior.

Science News Letter, October 6, 1945

BOTANY

Japanese Honeysuckle Has Some Redeeming Traits

➤ JAPANESE honeysuckle, a trailing vine with sweet-scented flowers that has become a smothering pest in open woodlands all along the Atlantic coast from Connecticut to Florida and inland as far at least as Tennessee, has some redeeming traits. Like one of those baffling characters in fiction, the villain who isn't altogether bad, it offers shelter and food to game birds and deer in time of stress, C. O. Handley, leader of the Virginia Cooperative Wildlife Research Unit here, reports in the *Journal of Wildlife Management*, (Oct.).

The tangled thickets of the vine, scrambling over bushes and fallen trees, offer almost ideal cover for bobwhite quail, wild turkeys and other upland game birds, as well as for cottontail rabbits. Turkeys sometimes make their nests in such thickets.

Game birds, and some song birds as well, eat the honeysuckle berries. These do not seem to be a preferred food, but they have the advantage of being available when berries and seeds on lower-growing plants are buried under deep snow or coated over with ice after glaze-storms. Chemical analysis of the berries indicates that they are fairly high in available food content.

Japanese honeysuckle retains a large part of its green leaves through the winter, so that it makes acceptable browse for deer. Here again, the vine is especially valuable in times of deep snow, as an emergency ration. The leaves are also eaten by rabbits and to some extent by game birds. Chemical analysis shows a food value comparable to that of timothy hay.

Although Japanese honeysuckle is a terrible nuisance in open woodlands, especially where the trees are trying to reestablish themselves after cutting-over or fire, it cannot stand much shade, and dies out after the new forest gets its growth and establishes a closed canopy overhead.

Science News Letter, October 6, 1945

ENGINEERING

Super-Pulverizing Process For Low-Grade Anthracite

➤ WITH FUELS of all kinds on the scarcity list and winter in the offing, more than ordinary interest attaches to a new apparatus for getting maximum heating value out of coal, especially low-grade anthracite with high ash content, on which U. S. patent 2,385,508 has been granted to Edgar S. Hammond of Bloomfield, N. J.

Essentially the device consists of a closed, racecourse-shaped loop of strong steel tubing. The coal, ground fine, is blown in near one end by a jet of dry, superheated steam. Additional steam jets send the particles around and around the course, jostling together and reducing each other further in size. An outlet near the other end takes off the inner part of the coal-powder stream, in which the particles have been reduced to microscopic fineness. Blown directly into the furnace firebox, this super-powdered coal burns with a thermal efficiency said to approximate that of gas.

Rights in the patent have been assigned to the Blaw-Knox Company.

Science News Letter, October 6, 1945

IN SCIEN

GEOGRAPHY

New Guinea Shangri-La Identified by Photographs

➤ THE NEW Guinea Shangri-La or Hidden Valley, from which three survivors of a plane crash were rescued by glider plane during the past summer, is now identified as the Grand Valley of the Balim River, discovered and explored in 1938 by a combined American and Dutch scientific expedition organized and led by Richard Archbold of the American Museum of Natural History.

The identity of the valley came about through a comparison of photographs taken by the Army just before the survivors were rescued with airplane photographs taken by the Archbold expedition. The identity is acknowledged by the Army, and particularly by Col. Ray T. Elsmore, who directed the recent rescue operations.

Early in the exploration of the Grand Valley by the Archbold expedition it was found that their flying boat could be landed near the lower end of the valley. A base camp was located there, supplies were flown in to this landing place, and from it the whole party of nearly 100 men was flown out of the valley when its work was done.

Science News Letter, October 6, 1945

ELECTRONICS

New Plant to Be Built For Electronic Research

➤ A GIGANTIC plant for the development of electronic equipment will soon be under construction in Syracuse, N. Y. It will provide laboratories for scientific research in the electronic field and modern factory buildings for the construction of television apparatus, radar for safety of ships and airplanes, frequency modulation radio and wire recording for entertainment and education, and many other types of equipment that depend upon electronics for operation.

The new plant, a project of the General Electric Company, will cost approximately $10,000,000 and will occupy 155 acres, laid out and landscaped like a college campus. The floor area involved is over a million square feet. The size of the plant is an indication of the part that electronics is expected to play in America's industrial future.

Science News Letter, October 6, 1945

WILDLIFE

Disease from Moldy Corn Kills Wild Ducks

➤ WOOD DUCKS in considerable numbers were made sick, and many of them died, after breathing clouds of spores given off by a mass of moldy corn on which they were feeding, in a flooded area near Havana, Ill., it is reported in the *Journal of Wildlife Management*, (Oct.). Dissection of several of the dead birds showed their lungs and other organs in the upper parts of their bodies to be overgrown with a growth of white mold, which was identified as *Aspergillus fumigatus*—a botanical second cousin of the mold from which penicillin is extracted.

Eating the moldy corn seems not to have caused the ducks any direct injury. It seems more probable that the microscopic propagating bodies, or spores, stirred into the air as the ducks were trampling in the spoiled grain, were breathed into their lungs and germinated there, producing effects like those of pneumonia.

A search of the records for similar cases disclosed a number of isolated instances, in which gulls, owls and other bird species beside ducks were the victims. A disease called brooder pneumonia, said to be well known to breeders of chickens, ducks and ostriches, is blamed on the same kind of mold.

Investigators of the present outbreak were Frank C. Bellrose, Jr., and Harold C. Hanson of the Illinois Natural History Survey, and Dr. P. D. Beamer of the University of Illinois.

Science News Letter, October 6, 1945

ELECTRONICS

Radio-Telephone Circuits Permit 24 Conversations

➤ RADIO-telephone circuits permitting 24 two-way simultaneous conversations on a single radio-frequency carrier wave, have been successfully demonstrated at the headquarters building of the International Telephone and Telegraph Corporation in New York, when two groups of 24 men in separate rooms conversed at the same time, the conversation passing through relay stations at Hazlet and Nutley, N. J.

The experimental network utilizes the pulsetime modulation principle of transmission recently perfected by the Federal Telephone and Radio laboratories and other laboratories of the corporation after nine years of research. Only one transmitter and receiver are required at each location for the 24-channel simultaneous communication.

Common waveguides and antennas are used both for transmission and reception: parabolic reflectors, eight feet in diameter, serve to beam the 1,300 megacycle carrier. The reflector at the New York end is located on the roof of the 35-story International Telephone building, those at the two New Jersey relay stations are located on high towers.

The present 24-channel arrangement makes use of a combination of pulsetime modulation plus a system of electronic time selection, certain fractions of each second being allotted each channel for the transmission of its signal. In contrast to mechanical systems evolved in the past, the method of time selection used is entirely electronic in operation, and was developed especially for this purpose.

It permits 24-channel voice communication with all the fidelity of modern telephone standards, it is claimed, and is much more compact than equipment designed for frequency selection.

Science News Letter, October 6, 1945

CHEMISTRY

Wood Protected from Acids By Plastic-Impregnation

➤ PROTECTION of wood from acid solutions or fumes is provided by a process in which the wood is impregnated with a plastic, developed in the wood preserving division of Koppers Company, Inc. The plastic-impregnated wood will be known as Asidbar. The treatment increases the weight and hardness of the wood, and gives it resistance to abrasion, water, and chemicals. It gives a black finish that need not be painted.

The treated wood is suitable for flooring on platforms and in railroad cars and other structures subject to rough use. It will probably be suitable for greenhouse construction where untreated wood is subject to rapid decay due to moisture and other conditions.

In the treatment, the plastic material is liquefied by high temperature and the wood is immersed in the compound in a sealed retort. The plastic is forced deeply into the wood fibers by high pressure at high temperatures.

Science News Letter, October 6, 1945

PUBLIC HEALTH

Polio Foundation Gives Large Sums for Education

➤ LARGE SUMS for the education of new workers to help in the fight against poliomyelitis were granted by the National Foundation for Infantile Paralysis during the past year.

The American Association of Medical Social Workers was given $101,760 for scholarships in medical social work, the foundation's annual report states.

For scholarships in health education $60,000 was granted to the U. S. Public Health Service. Because of the acute need for more nurses specially trained to give the orthopedic care polio victims require, a grant of $13,400 for scholarships in this field was made to the National Organization for Public Health Nursing.

Altogether the foundation allotted during the year ending May 31 the "unprecedented total of $4,157,814.15 for research, education and the treatment of patients." Almost half of this was appropriated for training of polio fighters in various fields and for broadening public understanding of the problem.

One of the largest single grants was $90,000 to the University of Wisconsin for study of the relation of nutrition and diet to resistance and susceptibility to infantile paralysis.

So that a new hospital at Caracas, Venezuela, built specially for treatment of infantile paralysis, might give even better service, it received a grant of $2,500 for training a brace-maker.

Although no preventive or cure for the disease has yet been found, the foundation continued to support research on viruses which cause this and other diseases in the hope of finding means of combatting them or checking their spread.

Science News Letter, October 6, 1945

GEOLOGY

Fossils Depict Life Millions of Years Ago

➤ FOSSILS depicting the forms of life which existed in the Midwest more than 280,000,000 years ago have been acquired by the University of Illinois. The 200,000 items composing the private collection gathered by R. R. Rowley, who made many important contributions to paleontology, include 147 type specimens, or originals from which a new genus or species was identified. Numerous others were set aside by Mr. Rowley as new types but not described by him before his death a decade ago.

Science News Letter, October 6, 1945

MEDICINE

Tropics Don't "Thin" Blood

Veterans need not fear "tropical anemia" as result of service in the Pacific. Blood values are generally the same everywhere.

➤ G. I.'S RETURNING from the Pacific can banish one disease fear from their minds, that of "tropical anemia" or "thinning" of the blood.

This condition does not occur in the tropics, Dr. Christopher J. Hamre, chairman of the zoology department of the University of Hawaii, said. Existence of "tropical anemia" has been disproved by many scientific studies all over the world, the zoologist said.

Dr. Hamre, who has made extensive blood value studies in Honolulu and compared them with other studies, said that blood values are generally the same everywhere. Furthermore, no blood value differences are apparent on racial lines.

"If a man is in good health, has no disease such as malaria, and has had proper food, he need not worry that the tropics have 'thinned' his blood," Dr. Hamre said.

The zoologist's study shows that there are no significant differences in blood values of men in latitudes ranging from Boston to Bombay and Manila. Determination of these blood values was made by measuring hemoglobin and red blood cell content, the two best yardsticks of blood quality.

Explaining the discomfort from cold which many persons feel on returning to the mainland, Dr. Hamre said this is caused by other factors, to which the body becomes accustomed without difficulty over a period of time.

Dr. Hamre cited the following examples of comparable blood values as measured by hemoglobin and red blood cell content:

Hemoglobin count (grams per 100 cubic centimeters of blood): Honolulu, 15.10; Kansas City, 15.83; New Orleans, 15.87; Boston, 15.06; Manila, 14.11; Bombay, 15.37; Buenos Aires, 14.80.

Number of red blood cells per cubic millimeter: Honolulu, 5,080,000; Boston, 5,350,000; Manila, 5,200,000; Bombay, 5,110,000; New Orleans, 5,260,000.

The differences in these figures are not in any instance significant, Dr. Hamre said.

In his Honolulu study, Dr. Hamre tested the blood of 137 young men who had lived in the Islands for from two years to all their life. Persons of Caucasian, Oriental, and mixed descent were used as subjects.

Dr. Hamre added that no differences in blood values were found on racial lines in either his study or the studies made in other regions of the world.

Science News Letter, October 6, 1945

BIOCHEMISTRY

Streptomycin's History

New drug that may become partner of penicillin is the result of a five-year search with many failures along the way.

➤ STREPTOMYCIN, newest weapon in the germ-fighter's armory, was no lucky chance discovery, Dr. Selman A. Waksman, bacteriologist at the New Jersey Agricultural Experiment Station, declared in an address in New York. He and his associates put in five years of hard work searching for it, and had to reject, as failures, several other compounds that at first seemed quite promising.

Dr. Waksman told the story of the search for streptomycin as guest of Watson Davis, director of Science Service, on "Adventures in Science," heard over the network of the Columbia Broadcasting System.

Streptomycin, now undergoing its first careful clinical tests, is not intended or expected to be a rival or replacement for penicillin. If it proves of value in the treatment of human ills it will rather act as a partner or complement to the well-known mold-made medicine, Dr. Waksman explained. This is because it will attack certain germs on which penicillin has little or no effect. In the class of germs that are immune to penicillin but which streptomycin will attack are the causes of such diseases as typhoid fever, dysentery, undulant fever, tularemia, whooping cough and plague.

It is not strictly correct, Dr. Waksman pointed out, to refer to either streptomycin or penicillin as germicides. They do not kill the germs outright but simply prevent them from growing and multiplying. The germs, unable to grow, gradually die. A new term has had to be coined to designate substances of this kind; they were christened "antibiotics" in the New Jersey Experiment Station laboratories, where much of the pioneer work in their investigation and use has been carried out. Some antibiotics are also germicides, but not all of them.

Penicillin's origin in a soil-inhabiting fungus or mold, *Penicillium,* is already well-known. But antibiotics do not all come from molds. One of the first to be discovered, gramicidin, comes from a species of soil bacteria. Streptomycin was found in a peculiar organism known as *Streptomyces griseus,* which is neither a bacterium nor a mold, but occupies a more or less intermediate position between these classes of lower plants, resembling bacteria in some respects, molds in others.

Science News Letter, October 6, 1945

PLANT PHYSIOLOGY

Vacuum Treatment Keeps Plants Fresh Longer

➤ A VACUUM treatment for certain cut flowers and plants which keeps them fresh and unwilted much longer than usual is announced by Dr. C. L. Hamner, R. F. Carlson and H. B. Tukey, of the New York Agricultural Experiment Station and Cornell University in Geneva, N. Y. (*Science,* Sept. 28).

Vacuum-treated narcissus flowers with six-inch stems were fresh and in excellent condition after six hours of exposure to direct sunlight at a temperature of 80 degrees Fahrenheit. Untreated flowers were badly wilted after 30 minutes and after five hours their petals were dry and crisp.

The treated flowers after the sunlight exposure were brought into a warm room with a temperature of 80 degrees Fahrenheit and left on a laboratory table overnight. The next morning, 21 hours after the vacuum treatment, they were showing signs of wilting, and by five p.m., 30 hours after treatment, they were all badly wilted.

Lilac branches placed in water immediately after treatment stayed fresh for five days, whereas untreated branches in water began to wilt within two days and were badly wilted in three.

Good results were also obtained with tomato plants, trillium flowers and some kinds of roses.

The treatment consists essentially in placing the plants or flowers in water in a drier. Air is pumped out and is replaced in the plants and flower stems by water.

Best results, in general, were obtained with plant materials having large leaves and stems and large inferior ovaries capable of serving as reservoirs.

Science News Letter, October 6, 1945

AERONAUTICS

Model Plane Used As Antiaircraft Target

➤ A RADIO-controlled oversized model airplane, carrying no pilot or crew, is used by the Army as a target for antiaircraft gunnery practice, it is now revealed. The 12-foot wingspan plane, powered with an eight-horse-power engine, cuts capers in the sky by radio control which finally stops the engine, opens a parachute and lowers the target safely to the earth.

When wanted for use, the small plane, with its engine wide open, is catapulted like a stone from a slingshot into the air, to be maneuvered by the radio apparatus into steep climbs and deep banks, travelling at about 125 miles an hour. When the gunnery practice is over, a switch is thrown on the remote control apparatus, causing a hatch on the topside of the target plane to open, releasing a parachute by means of which the plane slowly descends.

The radio control is by ultra-high frequency carrier which is generated and modulated by five different audio frequencies. Of these five frequencies, four are selected by the stick on the control box on the ground and are used to effect guiding of the plane. The fifth holds the parachute in place for the eventual landing.

Science News Letter, October 6, 1945

CONSERVATION

Forest Conservation as an International Plan

➤ FOREST conservation and expansion under a plan for international collaboration is recommended in a recent report to the United Nations Interim Commission on Food and Agriculture by that body's technical committee on forestry and primary forest products, according to Lyle F. Watts, a member of the committee and chief of the U. S. Forest Service. Forest conservation is a critical world problem, and must be solved if the world's supply of wood is maintained, the report states, despite constantly shrinking supply and heavy demands.

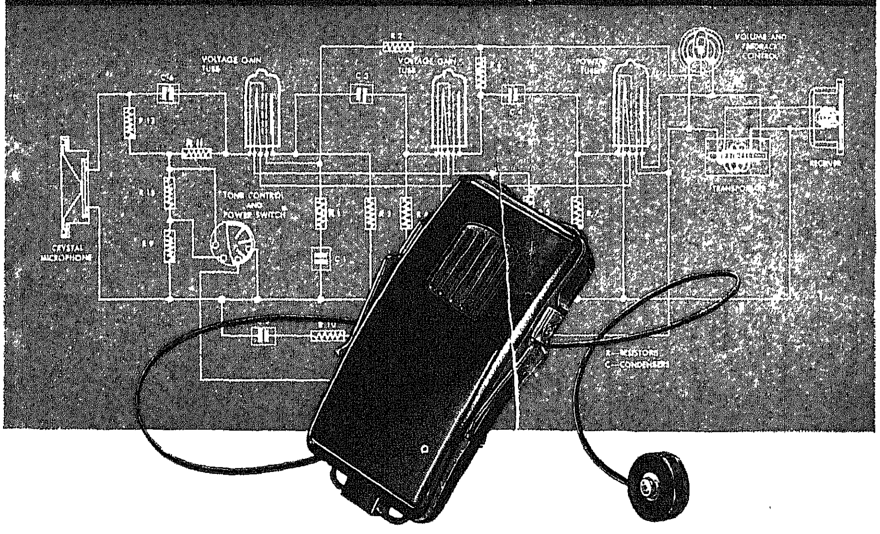
"The world is confronted," says the report, "with the inescapable fact that the forests—sole source of wood—are steadily diminishing. . . . Today the world stands on the threshold of developments in the use of wood that may be as revolutionary as the invention of the steam engine or the introduction of technology to the farm."

The technical forestry committee making the report is headed by Dr. Henry S. Graves, former chief of the U. S. Forest Service and dean emeritus of the Yale School of Forestry. On it are representatives of Great Britain, Canada, Soviet Union, France, Norway, Brazil, Czechoslovakia, and China.

Science News Letter, October 6, 1945

Newly born *young whales* are astonishingly large in comparison with their mothers; a blue whale at birth is from 23 to 26 feet in length, approximately one-quarter the length of an adult.

What Makes a Good Hearing Aid . . . No. 4 of a Series



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Do You Know?

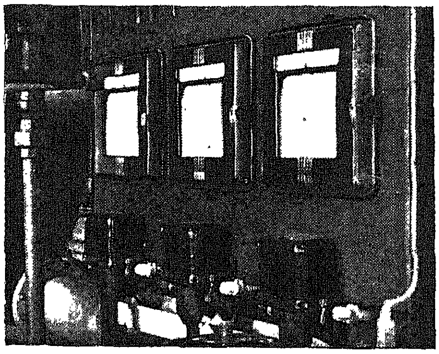
Pyroligneous acid is the crude acid obtained by the dry distillation of wood.

Tobacco pipes, probably 2,000 years old, have been found in Mexico.

Woodchucks, when old enough to leave their mothers, set themselves up in new or vacant burrows, and as a general rule live alone.

Fresh green and leafy *vegetables* are rich in vitamin A, and when gathered are nearly equivalent to oranges in vitamin C; they often lose 75% of the latter through standing, chopping, bruising and cooking.

The Chesapeake Bay retriever is one of the few breeds of *dogs* of American origin; it had its beginning about 140 years ago when hunters needed a powerful dog to retrieve wild waterfowl from the waters of the bay.



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Efficiency of water-treatment in the Arkwright Corporation's Finishing Division, Fall River, Mass., has been considerably improved since the former method of checking manually has been superseded by the three glass-electrode Micromax pH Recorders shown above. Now filter plant operators automatically obtain complete, accurate pH information starting with raw water which varies from 5 to 9 pH, including water at the alum-treatment point, and ending with finished water at 7 pH.

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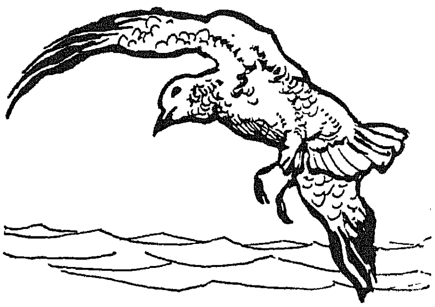
ORNITHOLOGY

NATURE RAMBLINGS

by Frank Thone



Bound to the Land

➤ COLUMBUS, the school histories all tell us, knew he was nearing land when he sighted birds on the wing. What kind of birds they were the record does not state; they may have been flights of inland species on their autumnal migration, or they may have been gulls or cormorants or some other shore-haunting birds taking a jaunt out beyond their ordinary range. Whatever they were, the Admiral of the Ocean Sea had an experienced sailor's knowledge of what to look for, and what not to expect, when far out of sight of land, and he knew well enough that basically sea birds are really land birds.

It is only natural for sea birds to stick close to the land most of the time. Practically all of them are fish-eaters, and despite their watery way of life fish also are found in greatest abundance in inshore waters. Moreover, many species of sea birds depend to a large extent on finding dead fish and other sea-food carrion cast up on shore, and naturally they must stay near the strand-line for that reason. Seagulls especially have a penchant for collecting garbage; their hope for scraps is what leads many of them to follow departing steamers, sometimes for many miles.

However, the farthest departures that sea birds make from the seashore are not on flights out over the open ocean but on expeditions inland. Seagulls are occasionally reported from all of our larger rivers, and they are as familiar a sight on the shores of the Great Lakes as they are on any salt-water coast.

Probably the most landlocked of all seagull rookeries is the one on a couple of rocky islets in Great Salt Lake. The story of the timely rescue of the Mormon pioneers' first crop by flocks of these birds, just as they were being devoured by a plague of grasshoppers, is familiar to every child in the mountain country.

Even farther inland, and at a higher elevation, too, are the colonies of seagulls and pelicans on Yellowstone Lake, where they have taken over one or two small islands as nesting sites. Although most of these birds migrate to the Gulf of California when cold weather comes, a few of them regularly hang around all winter, picking up their living in places along the shore where hot springs keep the lake water warmed up enough to prevent the formation of ice.

Science News Letter, October 6, 1945

A small amount of *ascorbic acid* powder added to the syrup as peaches are packaged for freezing will prevent the browning of the frozen fruit.

Cheetahs, the hunting-leopards of southwestern Asia and northern Africa, are rated as the fastest of all quadrupeds and have been clocked at 70 miles per hour.

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•New Machines and Gadgets•

⚙ *POSTAL SCALE, for weighing letters, is a single curved piece of material capable of rocking on its base. One upward-projecting curved arm has a slot to hold a letter, the weight of which causes the device to rock. The other arm, bent inward to the center of the arc, carries a freely-swinging pointer to indicate the weight.*

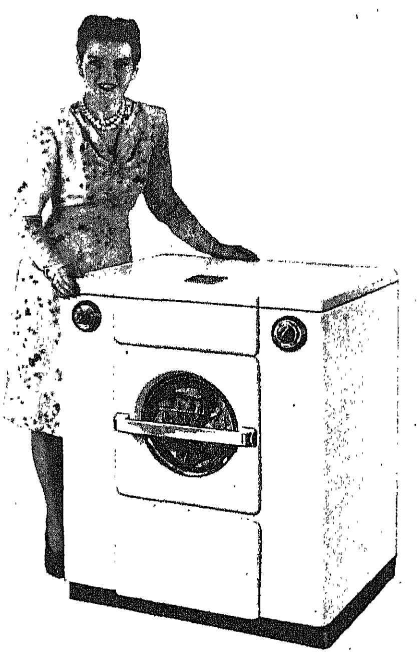
Science News Letter, October 6, 1945

⚙ *SPECIAL reel placed six feet in front of a bazooka makes it possible to shoot a telephone wire across a river 200 yards wide. The payout end of the wire on the reel is formed into a slip loop and taped to the muzzle of the bazooka from which it is picked up by the departing rocket projectile.*

Science News Letter, October 6, 1945

⚙ *GARMENT hanger, to hold various articles of wear at the same time, resembles the familiar wire hanger, but has two recesses in the upper wire of the frame to hold the shoulder straps of a slip, and movable clips on the lower wire to hold a skirt.*

Science News Letter, October 6, 1945



⚙ *AUTOMATIC cycle washers for installation in kitchens will soon be available. One, shown in the picture, is designed to harmonize with other equipment in the average kitchen. Electrically operated, its engineering details have not yet been revealed.*

Science News Letter, October 6, 1945

⚙ *PORTABLE medical refrigerator used in the Army is for the storage of whole blood, biologicals and perishable drugs. Made of aluminum, it weighs 175 pounds. It is electrically operated by a one-eighth horsepower motor, and has two compartments in which different temperatures are maintained automatically.*

Science News Letter, October 6, 1945

⚙ *DOUBLE-TRACK truck tires are protected by a soldier invention from stones and sharp objects that would otherwise become lodged between the tires. It is a simple bar that, inserted between the tires, rests on the wheel hub. When the truck is in motion, the bar pushes stones out of the path.*

Science News Letter, October 6, 1945

⚙ *VACUUM-PRODUCING equipment, an essential part of a cold-water de-aerator which is attached to water pipes, frees the water of oxygen and carbon dioxide without the use of chemicals. These gases cause destructive corrosion in pipes and boilers. A spray created in the apparatus makes gas removal easier.*

Science News Letter, October 6, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 279.*

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• Books of the Week •

➤ INTERESTING popular accounts of the origins of a number of our more common cultivated plants fill the pages of GREEN CARGOES, by Anne Dorrance. It traces the history of man-controlled plant migrations from the great discovery voyages of the Renaissance down to the highly specialized expeditions of the present time. (*Doubleday*, $2).

Science News Letter, October 6, 1945

➤ PACIFIC lands and their inhabitants have perforce become of great interest to Americans during the past few years, and will continue so for many years to come. To most of us, the animal life of these lands stands second in interest only to the human population. A ready welcome, therefore, should await MAMMALS OF THE PACIFIC WORLD, by T. C. Carter, J. E. Hill and G. H. H. Tate, a compact book giving popular descriptions of most species, with vivid black-and-white text illustrations. (*Macmillan*, $3.)

Science News Letter, October 6, 1945

➤ FEW MEN who write autobiographies are able to call the turn as closely as did Francis B. Sumner. On Sept. 3 his newly published LIFE HISTORY OF AN AMERICAN NATURALIST was released for sale. On Sept. 8 he died. In his book he is as he was in life: a tireless observer of all kinds of living things, from mice to men, an exact reporter of all that he saw, a determined supporter of the truth as he knew it and often a pungent commentator on the errors and foibles of men whose gift of reason should, he felt, have deterred them from some of the irrational behavior in which they indulged. (*Cattell*, $3.)

Science News Letter, October 6, 1945

➤ MOLDS of the genus *Aspergillus* have long been recognized as important both negatively as spoilage organisms and beneficially as food-ripening agents. More recently they have taken on new importance as converters of carbohydrates into various compounds useful in industry. Mycologists in all these fields, therefore, will welcome A MANUAL OF THE ASPERGILLI, by a pair of masters in their science, Charles Thom and Kenneth B. Raper (*Williams and Wilkins*, $7). The data presented are complete and marshalled in scholarly fashion; the illustrations are the best of their kind and help greatly in bringing out critical distinctions.

Science News Letter, October 6, 1945

• Just Off the Press •

THE ATOMIC AGE OPENS—*Pocket Books*, 252 p., 25 cents. A book for the layman, written before the Smyth report was issued.

THE FUNDAMENTALS OF ELECTRONICS AND THEIR APPLICATIONS IN MODERN LIFE—Henry Lionel Williams—*Blakiston*, 231 p., illus., 69 cents. A volume in New Home Library series.

HEALTH INSTRUCTION YEARBOOK 1945—Oliver E. Byrd, comp.—*Stanford Univ. Press*, 344 p., $3. A health text and reference book containing outstanding articles of the past year in the field of health.

MICROBES OF MERIT—Otto Rahn—*Cattell*, 277 p., illus., $4. The story of bacteriology told for the layman.

THE PSYCHOANALYTIC STUDY OF THE CHILD, Vol. 1, 1945—Otto Fenichel and others, eds.—*International Universities Press*, 423 p., $6.

A SHORT DICTIONARY OF ARCHITECTURE, Including Some Common Building Terms—Dora Ware and Betty Beatty—*Philosophical Lib.*, 109 p., illus., $2.75. With an introduction on the study of architecture by John Gloag.

SOUTH AMERICAN HANDBOOK—H. W. Wilson, 842 p., illus., $1.25. 22nd ed. Annual guide and book of reference to Cuba, Mexico, Central and South America.

THE STORY OF THE GREAT GEOLOGISTS—Carroll Lane Fenton and Mildred Adams Fenton—*Doubleday*, 301 p., illus., $3.50.

UNITED NATIONS PRIMER—Sigrid Arne—*Farrar*, 156 p., $1.25.

VETEBRATE PALEONTOLOGY—Alfred Sherwood Romer—*Univ. of Chicago Press*, 686 p., illus., $7.50.

Science News Letter, October 6, 1945

AERONAUTICS

Daniel Guggenheim Medal Awarded Dr. T. P. Wright

➤ THE DANIEL Guggenheim medal for 1945 has been awarded to Dr. Theodore P. Wright, United States administrator of Civil Aeronautics in Washington, who is an outstanding figure in aviation both in America and abroad. The citation with the award reads, "For outstanding contributions to the development of civil and military aircraft, and for notable achievement in assuring the success of our wartime aircraft production program."

This award was created for the purpose of honoring persons who make notable achievements in the advancement of aeronautics. It is made possible by the Daniel Guggenheim Fund and has been in existence since 1928.

Science News Letter, October 6, 1945

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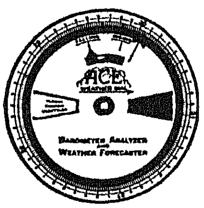

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Laws of Matter Up-to-Date

Compiled by HELEN M. DAVIS, *Editor of* CHEMISTRY

1. A single ATOM is the tiniest particle of any chemical element that can exist by itself and retain the qualities that mark it as that element.

2. All material things in the universe known to our senses are composed of one or more CHEMICAL ELEMENTS.

3. Substances composed of more than one element are known as COMPOUNDS. Atoms of elements are held together in compounds by electrical forces in the outer parts of their structure.

4. The smallest unit of a compound, usually composed of two or more atoms, is known as a MOLECULE.

5. There used to be 92 chemical elements, from hydrogen ($_1H^1$) the lightest, to uranium ($_{92}U^{238}$), the heaviest. There are now two new elements, NEPTUNIUM ($_{93}Np^{239}$) and PLUTONIUM ($_{94}Pu^{239}$).

6. When elements are represented, as above, by their chemical SYMBOLS, the subscript number is the atomic number. This is different for each element. The superscript number represents the atomic weight.

7. One of the qualities characteristic of matter is weight or mass. ATOMIC WEIGHT is expressed on a relative scale, as compared with the weight of hydrogen which is taken as one.

8. ATOMIC NUMBER is the measure of the electric charge on the nucleus of the atom. Atomic weight is the measure of the atom's mass.

9. Different samples of the same element, when tested by chemists, are sometimes found to have different atomic weights. Lead which occurs with radium, for example, has a different atomic weight from ordinary lead.

10. In all other ways the two kinds of lead are chemical twins, exactly alike except for weight. Elements which differ in weight only are called ISOTOPES.

11. Uranium has several isotopes. The usual kind, whose atomic weight is 238, was used to produce the two new elements. U-235 was used to make the ATOMIC BOMB.

12. Each of the new elements, neptunium and plutonium, has two isotopes whose atomic weights are 238 and 239.

13. Different elements, quite distinct in chemical behavior, may have the same atomic weight. We have $_{92}$U-238, $_{93}$Np-238 and $_{94}$Pu-238, all with different properties. Such elements are now called ISOBARS.

14. All atoms are composed of standard interchangeable parts. These are PROTONS, NEUTRONS and ELECTRONS.

15. Protons and neutrons make up the NUCLEUS of the atom. The structure of the atom is much like that of the solar system. The nucleus corresponds to the sun at the center. The planets are electrons.

16. The proton and the neutron each have a mass about equal to that of a hydrogen atom, which is 1 on the chemist's scale. Each is about 1800 times heavier than the electron.

17. The ELECTRONS, light in weight and some distance away from the heart or nucleus of the atom, revolve around the nucleus much as planets revolve around the sun. They are held in their courses by electric attraction.

18. The proton has a POSITIVE charge of electricity, the electron has a NEGATIVE charge equal and opposite to the positive charge of the proton. The neutron has no charge at all.

19. The difference in chemical properties of the elements is caused by difference in the number of protons in the nucleus. This is the ATOMIC NUMBER.

20. Atomic weight is the SUM of the weights of the protons and neutrons in the nucleus.

21. It is the NEUTRON which figures in the transmutations which give atomic power. Neptunium and plutonium were formed by bombarding uranium 238 with neutrons.

22. Neutrons can PENETRATE to the nucleus of heavy atoms when charged particles would be repelled by charges in the atom.

23. The HYDROGEN atom is believed to have just one proton as its nucleus, with one electron circling around it. Hydrogen's atomic weight and atomic number are each one.

24. Hydrogen has one isotope which is just like ordinary hydrogen except that it is twice as heavy. It is known as "heavy hydrogen" and sometimes as DEUTERIUM. Its compound with oxygen is called "heavy water."

25. The nucleus of HEAVY HYDROGEN contains one proton and one neutron. The atomic number of heavy hydrogen is one, corresponding to one proton. The atomic weight is two, corresponding to the two heavy particles, proton and neutron.

26. HELIUM has two protons and two neutrons in its nucleus. The two protons correspond to helium's atomic number two. The combined weights of protons and neutrons in the nucleus give helium its atomic weight 4. Two electrons, held in their orbits by the two protons, revolve around the nucleus.

27. The VOLUME of an atom is determined by the orbits of its outermost revolving electrons. Only a small fraction of the size of an atom is actually occupied by the protons, neutrons and electrons, just as the space occupied by the sun, the earth and other planets is only a small part of our solar system.

28. In spite of all the unoccupied SPACE, an atom is quite IMPENETRABLE to other atoms and to larger bodies. The electrons revolve millions of times a second, and keep everything out of the space within quite as effectively as though they were everywhere at once.

29. The only things that can get inside an atom are smaller things, FRAGMENTS of other atoms, protons, neutrons or electrons. They must be shot with just the right speed. These fragments of atoms are observed as radiations given off by radio-active elements which are breaking up spontaneously.

30. RADIATION is wave motion, known to us as the electro-magnetic waves used for radio transmission, heat, light, X-rays and cosmic rays. Large numbers of extremely tiny particles in motion together act like waves.

31. Three types of radiation are given off by radio-active substances. ALPHA particles are high-speed nuclei of helium atoms. BETA particles are high-speed electrons. GAMMA rays are electro-magnetic radiations similar to X-rays and light.

32. Of these, only the gamma rays are properly called radiations, and even these act very much like particles because of their short wave-length. Such a "particle" or quantum of gamma radiation is called a PHOTON.

33. In general, the gamma rays are very penetrating, the alpha and beta rays less so. Even though the alpha and beta rays are not very penetrating, they have enormous SPEED.

34. The speed with which atom particles travel is the source of atomic energy. ENERGY is capacity to do work. It is work stored up for future use.

35. If you raise a weight to a height above the ground and suspend it there by some device, the WORK you put into raising it can be stored there indefinitely as POTENTIAL ENERGY. It will be there, ready, whenever you decide to release it.

36. The energy which a moving body has because it is in motion is called KINETIC ENERGY. The kinetic energy of any particle depends upon its mass and the square of its velocity. Energy is conserved by the moving particle until it strikes an object, then work is done.

37. All ENERGY is either potential or kinetic. Either one can be converted into the other. These two conversions are continually occurring.

38. Particles of atomic size have kinetic energy arising from several different kinds of MOTION. All atoms are constantly in motion.

39. If the atoms are so dispersed that the material constituting them is a GAS, that gas will exert pressure on all sides of the container that holds it. If the container is a balloon bag, the imprisoned gas can do work by lifting heavy weights into the air.

40. Atoms which compose an element that will combine readily with another element, as hydrogen or carbon will combine with oxygen, have unsymmetrical arrangements of the outer electrons in their systems. These unsymmetrical arrangements tend to set up a sort of strain, which causes CHEMICAL COMBINATION to take place when elements with suitable combining powers are brought together.

41. These unsymmetrical arrangements give rise to FORCES which result in kinetic energy. This energy appears, for example, when carbon and oxygen burn to carbon dioxide, giving off heat, or hydrogen and oxygen explode to form water, again giving off heat.

42. Chemicals combining to form stable compounds give off energy in the process. These are known as EXOTHERMIC REACTIONS. Combinations which absorb energy, forming unstable compounds, are known as ENDOTHERMIC REACTIONS. Explosives, for example, which are highly unstable, are formed by endothermic reactions.

43. Chemical forces, electricity and heat are all forms of energy. Potential and kinetic energy may be distinguished in each case.

44. These energies all arise from motion of the atom as a whole, or motion resulting from attractions and repulsions between the outer PLANETARY ELECTRONS of the atom's structure.

45. Energy resulting from motion of particles deep within the structure of the atom was unknown until the discovery of RADIOACTIVITY.

46. Radioactive elements undergo SPONTANEOUS breaking up of their atoms, giving off alpha and beta particles and gamma rays. Loss of these particles causes the radio-active elements to change into other elements.

Laws of Matter Up-to-Date

Continued from previous page

47. The energies shown in these TRANSFORMATIONS are thousands of times greater than the kinetic energies which the molecules of a gas have by reason of their motion when heated. They are thousands of times greater than the energy changes per atom in chemical reactions.

48. The property of matter that connects it with motion is INERTIA. Inertia is opposition to change of motion.

49. One conclusion that appeared early in the development of the theory of RELATIVITY was that the mass due to inertia of a moving body increases as its speed is increased.

50. This increase implied an equivalence between an increase in energy of motion of a body (kinetic energy) and an increase in its MASS.

51. It was for this reason that Einstein suggested that studies of radioactivity might show the EQUIVALENCE of mass and energy.

52. Einstein's statement is that the amount of energy, E, equivalent to a mass, m, is given by the equation $E=mc^2$ where c is the VELOCITY OF LIGHT.

53. From this equation, one kilogram (2.2 pounds) of matter, if converted ENTIRELY into energy, would give 25 billion kilowatt hours of energy. This is equal to the energy that would be generated by the total electric power industry in the United States (as of 1939) running for approximately two months.

54. Compare this fantastic figure with the 8.5 kilowatt hours of heat energy which may be produced by BURNING an equal amount of coal.

55. Until the atomic power research program, no instance was known of matter being converted into energy without more energy being used to produce the transformation than was released by it.

56. Two axioms of physics stated: (1) MATTER can be neither created nor destroyed; (2) ENERGY can be neither created nor destroyed. For all practical purposes they were true and separate principles until about 1940.

57. It is now known that they are, in fact, two phases of a single principle, for we have discovered that energy may sometimes be CONVERTED into matter and matter into energy.

58. Such conversion is observed in the phenomenon of nuclear FISSION of uranium, a process in which atomic nuclei split into fragments with the release of an enormous amount of energy.

59. The extreme size of the CONVERSION FACTOR explains why the equivalence of mass and energy is never observed in ordinary chemical combustion.

60. We now believe that the heat given off in such COMBUSTION has mass associated with it, but this mass is so small that it cannot be detected by the most sensitive balances available.

61. Transformation of matter into energy is an entirely different sort of phenomenon than the usual chemical transformations, where the matter is changed into a different form but its MASS persists.

62. From the standpoint of the Laws of the Conservation of Matter and of Energy alone, transformation of matter into energy results in the DESTRUCTION of matter and CREATION of energy.

63. The OPPOSITE transformation, which astronomers believe may be going on in some of the stars, amounts to the destruction of energy and the creation of matter.

64. It is difficult for us to imagine the reconciliation of two such different concepts as matter, with its characteristic mass or weight, and energy, which does not have this quality. We shall, perhaps, be forced to think of the stuff of the universe as some such combination of matter and energy as would be symbolized by the coined word "MATTERGY."

Science News Letter, October 6, 1945

For Exciting Progress Reports Read CHEMISTRY

To keep further up-to-date on important new advances in chemistry, read CHEMISTRY magazine each month. Such developments as the atom bomb and the researches looking toward the utilization of atomic energy are explained in this Science Service publication.

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Question Box

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How much of the new poison, ANTU, is needed to kill 300,000 rats p. 211.

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Where published sources are used they are cited.

CIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • OCTOBER 13, 1945

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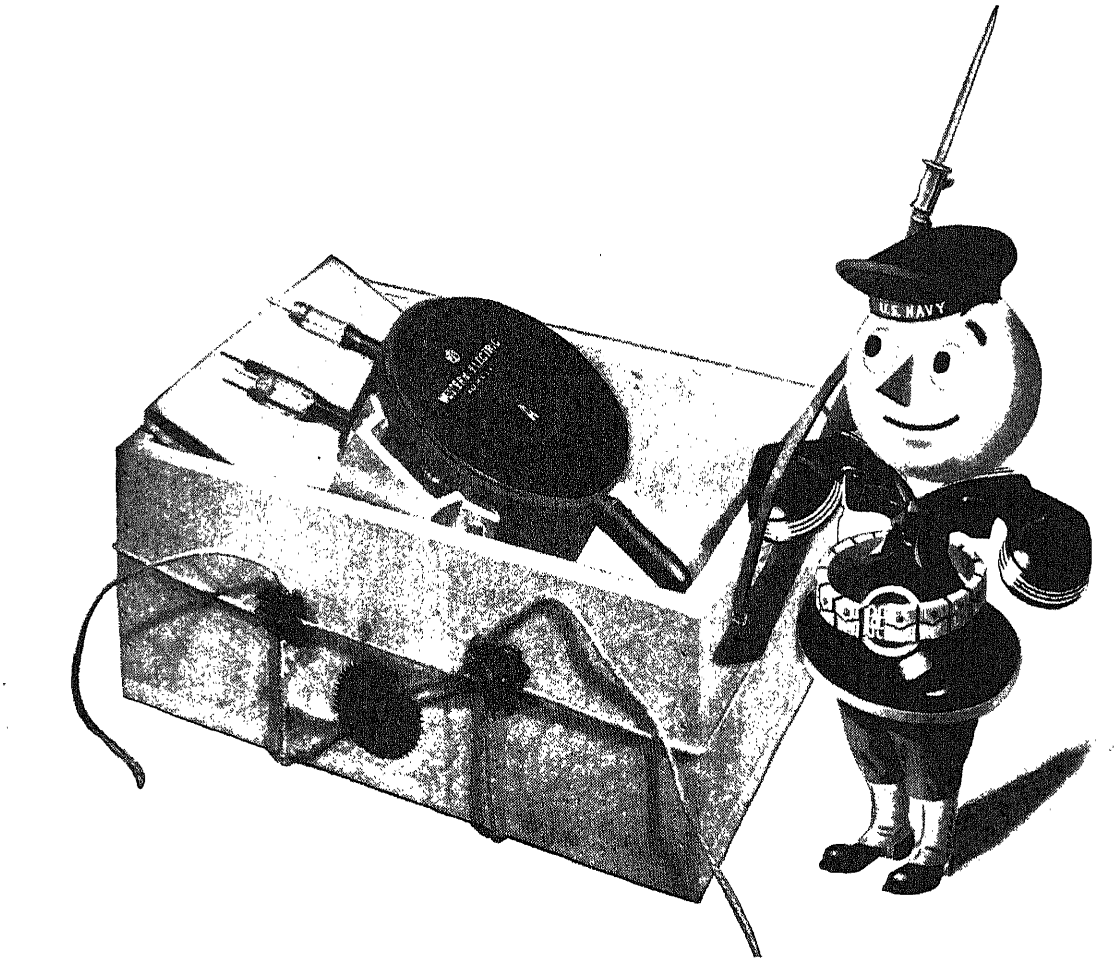
A SCIENCE SERVICE PUBLICATION



VICTORY REVEALS A MYSTERY

More than two years ago, an engineer of the Laboratories visited *U.S.S. Boise,* returned with a mysterious box which went into the Laboratories' vault. Now, victory opens the box and discloses a special kind of electron tube called a magnetron. It was part of a Radar which furnished data to aim *U.S.S. Boise's* guns during the night action off Savo Island on October 11-12, 1942. Because of the high frequency generated by this magnetron, the Radar was not detected by the enemy and the action was a complete surprise. Six Japanese warships were sent to the bottom of the sea.

This magnetron is a symbol of the Laboratories' enormous war program. Half of it was devoted to Radar, the other half gave birth to radio transmitters and receivers, sonar apparatus for the Navy, loudspeaker systems for ships and beachheads, fire-control apparatus for anti-aircraft artillery. Coming months will unfold the story of these and many other contributions of the Laboratories to the victory of our arms.

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MEDICINE

Carbon Dioxide for Polio

Inhalations of carbon dioxide in oxygen have given good results in first cases reported. Given continuously for 24 to 38 hours after patient is admitted.

➤ A NEW treatment for infantile paralysis is being tried at Charity Hospital, New Orleans, La. The treatment consists essentially in putting the small patients in an oxygen tent where they inhale 5% carbon dioxide in oxygen.

Good results in all but one of 13 cases are reported in a preliminary announcement made to Science Service by Dr. Branch J. Aymond, of the Louisiana State Board of Health, Dr. Ralph V. Platou, professor of pediatrics at Tulane University School of Medicine, and Dr. G. Pelton Kelly, also of Tulane.

The treatment was first tried as an emergency measure for a six-year-old girl with acute encephalitis, bulbar and spinal poliomyelitis. Dramatic improvement followed the inhalations of carbon dioxide in oxygen.

"The response was so impressive that this simple and apparently harmless procedure was employed in 12 other cases having varying manifestations," the doctors report.

In all but one case there was relaxation, prompt relief of pain, rapid return of muscle strength, early functional improvement and the patients volunteered the information that they felt well.

Appreciating that the course of infantile paralysis varies greatly from one patient to another, almost regardless of the kind of treatment given, and that no claim can be made for a treatment tried in such a small number of cases, the doctors nevertheless feel it is worth calling to the attention of other workers for independent evaluation.

At present the carbon dioxide-oxygen inhalations are given continuously for 24 to 36 hours after the patient enters the hospital or intermittently for one to two hours several times daily. Other general measures for treating infantile paralysis are being continued.

The effects of rebreathing and of using varying mixtures of carbon dioxide in oxygen are now being studied. The scientists also plan experiments to test the relation of carbon dioxide to production of acetylcholine, a chemical liberated from nerves when they are stimulated.

Science News Letter, October 13, 1945

CAUSES "SUNTAN"—An alkali substance present in all ultraviolet-transmitting materials except a new glass and quartz causes glass to pick up a "suntan" under the bombardment of invisible ultraviolet radiation. Here, Dr. Harvey C. Rentschler, research director for the Westinghouse Lamp Division, is shown studying spectral lines of the metallic elements in glass. This is the final step in his experiment which led to the discovery.

BIOLOGY

Eyes Need More Protection

Damage to sight from ultraviolet light may occur without obvious signs of eye injury, studies with baby chicks show.

See Front Cover

➤ WELDERS and their helpers, skiers, flyers and sunbathers may need more eye protection from ultraviolet light than has previously been supposed, it appears from studies reported by Dr. Ernest Wolf. of the Harvard Biological Laboratories, to the National Academy of Sciences.

The danger of "snow-blindness" among skiers and Arctic explorers and of eye damage among persons exposed to invisible ultraviolet light on their jobs is well known, Dr. Wolf points out. He has found, however, that more of the ultraviolet is dangerous than had previously been supposed.

Ultraviolet light is invisible and consists of light waves shorter than those that give visible light. Visible light starts with waves 400 millimicrons long and goes on to waves 750 millimicrons long. Short might seem a better way of describing their length since one millimicron is only 1/25,400,000 of an inch.

The waves of ultraviolet light are all shorter than 400 millimicrons but scientists have heretofore thought that ultraviolet between about 300 and 400 millimicrons in length did not harm the eyes. Dr. Wolf's studies, sponsored by the American Optical Company, show that ultraviolet ranging in wavelength from 300 to 365 millimicrons can damage visual function even though the eyes themselves show no injury.

His studies were made with baby chicks, as shown on the front cover of this Science News Letter, since their eyes are very similar to human eyes and since the chicks will keep their eyes wide open during exposure to ultraviolet light. Tests on human eyes could not be made because of the possibility of damaging the eyes.

The chicks were first exposed to ultraviolet light from a quartz mercury lamp for an hour. The lights were then switched off and the chicks left in complete darkness for an hour. This would have been more than enough time for their eyes, if unaffected, to have become adapted to the dark and their visual functions would have been normal.

The chicks were then placed in individual glass jars, each jar surrounded by a glass cylinder bearing alternate transparent and opaque vertical stripes. The stripe system moved at a given rate and produced flicker to which the chick responded by jerky head motions. The experiment determined the intensity of light needed for flicker recognition.

In comparison with unexposed chicks, the test chicks, due to ultraviolet injuries, required 45 times as much light to recognize the flickering stripes. Not until three days later could their eyes see normally again. By shielding the ultraviolet lamps with protective glass filters that cut out the invisible ultraviolet light at about 365 millimicrons and below, it was discovered that the eyes of chicks exposed to the filtered light functioned normally.

The lamps were then shielded with a series of less efficient glass filters that cut out shorter ultraviolet radiations. Repeated experiments with these filters revealed that ultraviolet below about 365 millimicrons impaired visual functions in varying degrees depending on the wave length transmitted.

Science News Letter, October 13, 1945

ECONOMICS

Curb German Production

Engineering Council recommends that she be debarred from production of nitrogen, aluminum, synthetic liquid fuels, atomic energy and oversupply of steel.

➤ TO DESTROY German militarism and insure that Germany will never again be able to start another war, a joint council of American engineers recommends that this twice-aggressor nation be prohibited from the synthetic fixation of nitrogen, the production of aluminum and of synthetic liquid fuels, have only limited capacities for steel and steel alloys production, and be prevented from any attempt to develop or use atomic energy.

The joint council that makes this recommendation is composed of 35 prominent engineers and technological specialists representing five of the leading national American engineering organizations. Its complete report is based on several months of study and was recently transmitted to the proper government authorities in Washington. It is now released to the public in New York at the council's headquarters.

The organizations with representatives on the joint council are the American Society of Civil Engineers, American Institute of Mining and Metallurgical Engineers, American Institute of Electrical Engineers, American Society of Mechanical Engineers, and the American Institute of Chemical Engineers.

The report is built around the expressed philosophy that "it is necessary to subtract from aggressor peoples, for a long period of recuperation, the fundamentals of their industrial potential for armed aggression." At the same time it is held that "complete elimination of German industries, leaving agriculture as the sole occupation, would produce an economic dislocation and social chaos of destructive magnitude, not alone in Germany but throughout Europe."

The report details the industrial factors that must be controlled. Control must be exerted, it states, over energy allocation; raw material elimination or limitation, applied to specific elements critical to war industry; processing, fabricating and new construction; scientific research; and economic subsidies.

Coal stands at the head of the list in the field of energy and among the raw materials in German economy, it says. Coal supplies 85% of the nation's energy in power and light, and is the raw material for Germany's huge chemical industry, the synthetic nitrogen industry and the synthetic fuel industry. Coal production should therefore be controlled, the council feels.

Modern war is impossible, the report declares, without a number of products required in large quantities. These include nitrogen for explosives, aluminum for air power, steel and steel alloys for land and sea warfare, and liquid fuels and lubricants to insure mobility of the instruments of war.

Science News Letter, October 13, 1945

INVENTION

Double Adhesive Sticks Rubber to Metal

➤ RUBBER should be, in many ways, the ideal protective coating for metal: it is water- and acid-proof, and some of the synthetic varieties are oil-proof also. The big drawback is that rubber doesn't want to stick to metal, but is always peeling off at just the wrong moment.

For better bonding of rubber to metal, Henry H. Harkins uses a double adhesive. First he coats the metal with a synthetic resin of the Bakelite type—phenol-aldehyde compound. This sticks well to metal. Then he sticks the rubber to this with a cement composed of rubber, a resin, and an oxidizing material.

Patent 2,386,112, covering this bonding system, is assigned to the United States Rubber Company.

Science News Letter, October 13, 1945

De-inking paper, in the repulping process to make new paper, is carried out with sodium metasilicate and rosin soap added after pulping; the alkali and rosin lift the inks from the surface, and emulsify the oily base.

SCIENCE NEWS LETTER

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TOPOGRAPHY—GEOLOGY

Maps for Victory

Geological and topographical maps made in Washington gave Allied armies advanced information of terrain in enemy country for invasion or advancement.

➤ GEOLOGICAL and topographical maps of enemy country made by the U. S. Geological Survey, showing terrain to be traversed in invasions and advances in Europe and in the Pacific area, played an important part in the war, it is now revealed. A secret group of 80 military geologists is responsible for these charts, which indicated both surface and underground formations.

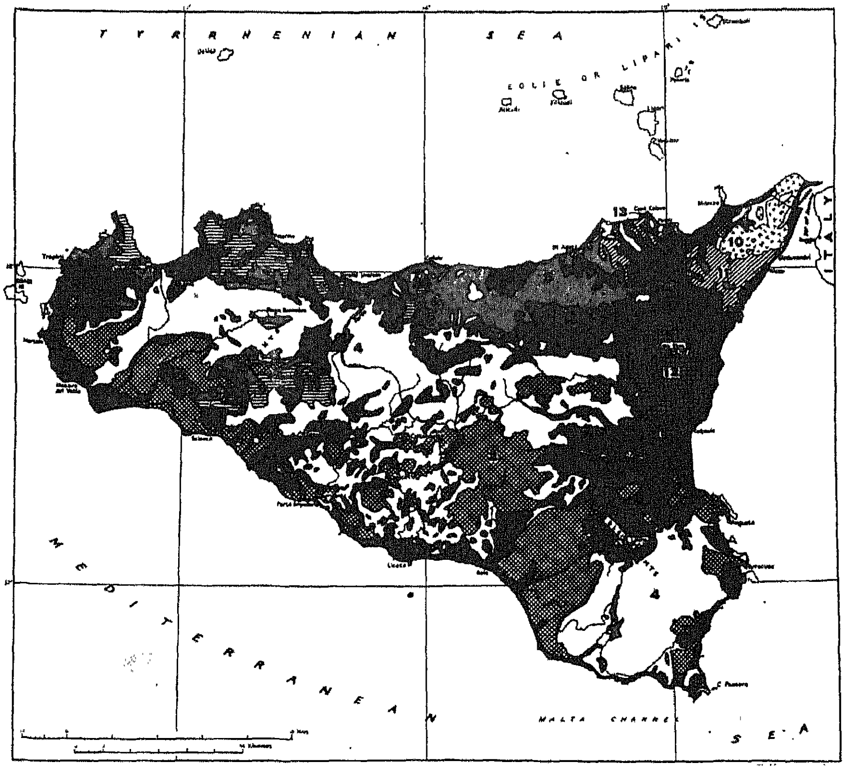
The data necessary to make such maps showing rocks, mountains, streams, plains, types of soil and other conditions, were derived in large part from geological maps and information collected in prewar days from geologists all over the world and preserved in the library of the Geological Survey. Most geologists who make maps exchange their product freely. The primary reason for the preservation of foreign maps is their economic value, but they proved to have an unforeseen military use of great importance.

This military geological unit furnished the Army with complete geological folios covering every operation in which American troops took part or planned to take part, with the exception of Normandy, handled chiefly by British geologists, and the Gilbert islands, about which the unit had no specific or reliable information.

The folio charts showed much more than surface conformation. They indicated where the soil was suitable for digging foxholes, where to establish observation posts and pillboxes, where the safest and most protected trails were located, where roads could be constructed, where bridges could be built and where streams could be forded without bridges.

The charts indicated also where wells could be drilled with a reasonable probability of obtaining fresh water, and if underground conditions were satisfactory in areas where the surface seemed suitable for the construction of an airfield. They furnished every bit of information available relative to surface or sub-surface geological conditions that might have any value to a mechanized fighting force.

Science News Letter, October 13, 1945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E O L I E O R L I P A R I
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13

FOR VICTORY—This pattern of dots, dashes and shadows revealed to the Military Geology Unit of the Interior Department and Army Engineers the number and location of springs and other sources of good water in East Sicily, where airfields might be built or camouflaged and the safest places for our ground forces to land, march and fight.

PHOTOGRAPHY—ELECTRONICS

Automatic Radar Camera Embodies New Principle

➤ EXPECTED to have both military and commercial applications, an automatic radar recording camera developed by the Fairchild Camera and Instrument Corporation of New York permits an operator to observe the luminous picture on the radar oscilloscope while the camera is recording the image on 35-millimeter motion picture film.

Wired directly into the radar circuit and mounted above the oscilloscope, the camera, containing a beamsplitter in the viewing hood, passes yellow light to the eye, reflects only the more actinic blue light upward to the lens, with little danger of fogging the film.

The camera is of the interchangeable magazine type, holding 100 feet of film. Its action is fully automatic, the shutter opening at the beginning of the radar impulse, closing as the film is moved for the next exposure. A selector switch controls the range of exposures of once every scan, every other scan, three out of 12 scans or five out of 60 scans.

In the recording chamber, a watch, data card and six indicator lights record on each frame the time, number of exposure, range setting, altitude and scale for permanent reference.

Operating at extremes of temperature and altitudes up to 35,000 feet, the camera, through the radar scope, is also said to have a range of 100 miles on a single frame compared to the standard aerial camera's usual range of five miles.

Although developed primarily for use with radar, other applications may be made, including laboratory experiment recording, and like uses requiring an automatic permanent record.

Science News Letter, October 13, 1945

MEDICINE

Fed by Vein for 8 Weeks

The patient was able to undergo a major surgical operation. Was given salt and sugar solution, enzymic-digest of casein, and vitamins C, B and K.

➤ THE CASE of a patient who was fed entirely by vein for eight weeks, taking nothing by mouth except an occasional glass of water, is reported by Drs. Alexander Brunschwig and Robert R. Bigelow and Miss Sabra Nichols, of the University of Chicago Department of Surgery, in the *Journal of the American Medical Association* (Oct. 6).

The patient's condition was "fair to good" during this long period of feeding by vein. After 46 days of it he was able to undergo a major surgical operation. The scientists believe he would not have been able to remain in as good condition and withstand the operation if he had not been benefiting from the vein feeding.

The daily diet injected into his veins consisted essentially of about three pints of salt and sugar solution and two pints of fluid containing sugar and an enzymic digest of casein to supply protein. Sometimes he was given a gelatin solution. Vitamins C, B, and K were given at intervals by hypodermic injection. He was also given five blood transfusions.

The reason for feeding the patient by vein instead of mouth was the development, following removal of a cyst on the kidney, of a large fistula high in the small intestine. The experience in this case, the scientists state, suggests that similar conditions may be treated by withholding all food by mouth and feeding by vein. Often in such cases the discharges from the fistulas or openings digest the wound edges, thus preventing healing, and also depleting the patient's condition because of loss of partially digested food. If the patient can be kept nourished without food going into his stomach and intestinal tract, these complications are avoided or reduced and the wound heals to the stage where it can be closed by surgery.

Science News Letter, October 13, 1945

GEOGRAPHY

Textbooks Need Rewriting

Geographies will have to devote more space to Asia and the Pacific islands. Maps will have to be changed to show new national boundaries.

➤ GEOGRAPHY textbooks for American schools now need rewriting, with more space devoted to Asia and the Pacific islands, because political and economic developments which will have a direct bearing on America may be expected in that area. China has the population and the natural resources to become to Asia what the United States is to the Western Hemisphere; Russia becomes a Pacific naval power; an independent Korea will be to some extent an American responsibility; Japan may have to be under American control for years, and many Pacific islands will probably become permanent possessions of the United States.

Of course, maps will have to be changed to show the new national boundaries, in Europe as well as Asia, and the right names will have to be given. Manchukuo, so called by the Japs, will be Manchuria again, and Chosen will be Korea once more, the name the Koreans prefer. Many other Japanese names will be discarded in favor of original names, but new names and new national boundaries are not the principal reasons for new American school geographies. The real reasons are strategic, social, cultural, economic and political.

With aircraft, radio and fast ocean vessels, personal contact has broken down former barriers between the East and the West, and America can now expect, as one result of the war, to play an important part in Asiatic development. As a preparation, American youth needs accurate, reliable information relative to the peoples of Asia and the Pacific islands, their customs, culture, economics, and natural resources, and the physical conditions of the regions in which they live.

The Near East, in the future, may produce, under American and English leadership, much of the world's supply of oil and petroleum products; India is setting out on a program in training scientists, following American procedures, to develop India's industries and agriculture and to provide better health for her people; and China, in gratitude to America for her assistance during the war, will look to us for help in becoming a real democracy and a truly great industrial and agricultural nation.

From a strategic standpoint, American youth needs a knowledge of Asia and the Pacific. Japan will require watching, and perhaps military control, for many years. The Soviet Union, now in possession of the Kuriles, Sakhalin island and excellent ice-free ports and naval bases on the mainland coast, assumes a new importance in the Pacific area. China may, and probably should, become a naval power. These factors alone are sufficient reasons for more complete geography courses in American schools.

Science News Letter, October 13, 1945

RADIO—AERONAUTICS

New System Eliminates Static in Planes

➤ STATIC, the bane of aircraft communication, is combated with an artificial drizzle of electrically charged droplets, in a system on which U. S. patent 2,386,084 has been issued to Ralph C. Ayres of Kansas City, assignor to Transcontinental and Western Air, Inc.

To drain away the static charges, Mr. Ayres first provides a kind of lightning-rod system in reverse: three or more long rods or trailing wires from wingtips and tail, together with a larger number of short metallic fingers; all connected together but all insulated from the plane itself. This system is calculated to pick up an electric charge from the air directly to the rear of trailing edges.

Curved over towards these finger-like projections are nozzles conveying a liquid from a reservoir within the plane. They are filled with wicks, and so adjusted that droplets of the liquid can be released in controlled small quantities. This liquid of course carries a charge of the same sign as that of the plane itself, while the trailing fingers and rods are oppositely charged. Therefore each droplet carries away with it a small fraction of the plane's static charge, which is neutralized without fuss or sputter when the droplet is attracted to the trailing metallic system.

Science News Letter, October 13, 1945

CHEMISTRY

New Role for Amino Acids

Studies suggest that some of them may be chiefly used by the pituitary gland, hazelnut-sized organ at the base of the brain.

➤ THE ESSENTIAL amino acids furnished by animal proteins such as meat, cheese and eggs have assumed a new role in nutrition as a result of studies by Dr. L. T. Samuels of the University of Utah.

Heretofore scientists have believed these amino acids were required and used by the body directly in production of its own protein tissue in flesh and blood. Dr. Samuel's studies suggest that some amino acids may be chiefly used by the pituitary gland, hazelnut-sized organ at the base of the brain.

This small but highly influential gland produces chemicals called hormones. Among them are one that influences growth, another that influences activity of the adrenal glands, and others that effect other glands such as the thyroid and sex glands.

Through its various hormones, this gland plays a role in the body's ultilization of carbohydrate, fat and protein foods, Dr. Samuels reported at the third annual hormone conference at Mont Tremblant, Canada.

If an animal whose pituitary gland has been removed is fed the same diet that will keep a normal animal growing and healthy, the animal without the pituitary gland will also increase in weight but not as much as the normal one. Its weight increase, moreover, will be almost entirely in deposits of fat, rather than in formation of muscles and other tissues.

The picture is reversed if the animal is given both pituitary growth hormone and thyroid hormone. Then the animal gains weight more rapidly than the normal animal, but stores more water and protein and less fat.

Under these circumstances, the animal which increases most in weight is also the one which consumes the greatest amount of his food as energy. The reason for this, Dr. Samuels explained, is that the weight gain comes from stored water and low energy material, that is, protein.

From this and similar studies Dr. Samuels reasons that the value of protein to the animal will be affected by the pituitary gland if this gland affects protein storage. The biological value of protein will be much lower in an animal without its pituitary and particularly if the gland is failing to produce its growth hormone.

Starvation, other scientists have found, affects the pituitary gland very early. One of the first things that happens is a wasting of the sex glands, resulting from decreased production of the pituitary hormone affecting these structures. The wasting can be reversed even in a starving animal if pituitary gonadotropic hormone is given.

This effect of starvation on the pituitary gland is not a question of vitamin lack, Dr. Samuels stated. No one knows exactly what the factor responsible for it is. It may involve the amino acids. If so, the relative biologic value of a protein food may be determined not only by its general effect on body cells but by its ability to supply what the pituitary glands needs to produce its hormones.

Science News Letter, October 13, 1945

ENGINEERING

Long Distance 'Phone Calls May Be Automatic

➤ ALL LONG distance telephone operators will some day be dialing calls, directly and unassisted, straight through to the called telephone even though it be at the other side of the continent. This method, now in operation to a certain extent, is the announced objective of the American Telephone and Telegraph Company, according to a recent statement made by its president, Walter S. Gifford.

The ultimate aim, Mr. Gifford states, goes further, and will be reached when telephone subscribers can dial "anyone anywhere in the United States or perhaps anywhere in the world just as simply and promptly as you dial the telephone of a neighbor in your own home town." This long-range goal, he says, is "undoubtedly many years away from practical use."

The first plan is already in use. About 5% of the daily 2,700,000 toll board calls are now being handled by the operator toll dialing method. Under this method the customer dials the outward toll operator, who in turn completes the call to the distant telephone through toll dial equipment, usually without the assistance of another operator.

Science News Letter, October 13, 1945

MEDICINE

Forensic Medicine Institute To Be Established

➤ AN INSTITUTE of Forensic Medicine, first of its kind in the world, will be established at New York University College of Medicine as part of its expanded postwar educational program. The new institute will give instruction in legal medicine. It will be owned by New York City and operated in partnership with the university as a collaborative venture between it and the city's Medical Examiner's Office. Besides training medical examiners to replace old-style coroners in criminal investigation, the institute is expected to play a leading part in the exploration of medico-legal problems in America.

Medical needs of the middle-income group are emphasized in the designs for the university's new hospital and medical college buildings. Despite its name, New York University is privately supported and governed, receiving no city or state funds.

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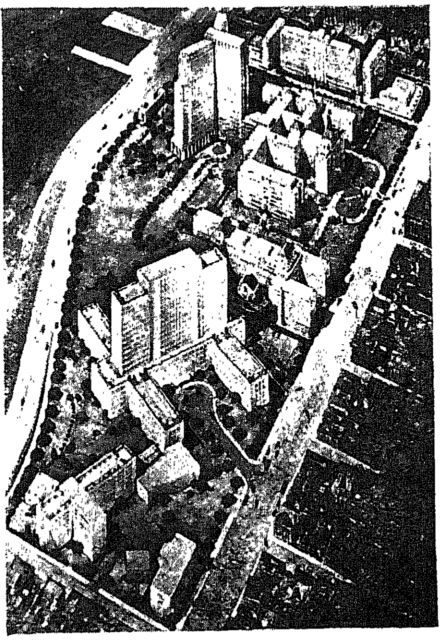

MEDICAL CENTER — Architects' drawing of the proposed New York University-Bellevue Medical Center between 25th and 34th streets, First Avenue and East River Drive.

MEDICINE

Streptomycin Now in Use In Army Hospitals

➤ CIVILIANS are not the only ones having difficulty in obtaining streptomycin, new sister drug to penicillin. Although this new antibiotic is now being used in 30 Army general hospitals, joint Army-Navy expectations for September are about double the anticipated production, it appears from a statement made by Maj. Gen. Norman T. Kirk, Surgeon General of the Army.

"Joint Army-Navy expectations for September are 162 ounces," he said, "but it is anticipated that production will be not more than 70 ounces. It is hoped that Army-Navy procurement can be doubled in October—for military needs alone now are about 2,000 ounces a month."

The standard daily dose, given in three injections over a 24-hour period, is one gram, or about one-thirtieth of an ounce.

Production of streptomycin is limited because it is obtained from an organism found in the soil and must be grown under carefully controlled laboratory conditions which cannot be hurried.

Similar difficulties in production of penicillin in the early days were overcome in part because of the pressure of war needs and with the aid of wartime priorities. The industry, Gen. Kirk said, is doing what it can to supply the demand for streptomycin without the aid of the advantages penicillin production had.

General Kirk explained that the Army's principal needs are for treatment of soldiers with severed spinal cords who developed urinary tract infections because of a loss of bladder function; and to some extent in treating some cases of meningitis and other infections which do not respond readily to penicillin therapy.

Science News Letter, October 13, 1945

ORDNANCE

All-Electric Torpedo Used Against Jap Shipping

➤ ANOTHER SECRET weapon used successfully against the enemy, the Mark 18 all-electric torpedo is credited with sinking over a million tons of Japanese shipping, some 300 ships, ranging in size from 500 ton cargo vessels to 42,500 ton battleships.

Announced by the Navy Department, the torpedo, its electric motors powered by specially designed storage batteries, speeds just below the surface of the water leaving no tell-tale wake to warn the enemy in time to maneuver out of its path.

The boiling wake left by steam turbine driven torpedoes points a finger of bubbles to the approximate position of the submarine, and destroyers have but to charge back through the torpedo's course and drop depth charges in the area before the slow moving submarine can slink off to safety. Submarines, if not destroyed by the depth charges, frequently suffer damage caused by the concussion of the exploding charge.

Designed specifically for under water firing, the Mark 18, less able to withstand the impact of striking the water in above-the-surface firing, is not used by PT boats, torpedo bombers or destroyers. Gyroscopically controlled, it is over 20 feet long, weighs about one and a half tons and contains some 2,000 parts.

Manufactured solely by Westinghouse Electric Corporation's plant at Sharon, Penna., its cost is approximately $6,500, about two-thirds that of the corresponding steam torpedo for submarine use. The first attack by electric torpedo fired by a U. S. submarine was made in September, 1943.

Science News Letter, October 13, 1945

PSYCHIATRY

Mentally Ill People Likely to Be Color Blind

➤ THE MENTALLY ill are much more likely to be color blind than normal individuals. Approximately one out of every three men suffering from schizophrenia, the most common of mental diseases, had trouble in distinguishing colors, Dr. Harold M. Kaplan, Dr. Roland J. Lynch and associates at the Hospital for Mental Diseases, Secaucus, N. J., found by studying 403 cooperative psychotic patients.

A comparatively large number of mentally ill women were also found to be partially color blind, they reported to the *American Journal of Psychiatry*. The greatest number of schizophrenics of both sexes with color defects were unable to distinguish red from green.

These figures include only those who actually wanted to take part in the test. Others who refused to cooperate or whose natural tendency to give false replies made their scores worthless were excluded.

The doctors suggest the possibility that color blindness is not a peculiarity of the eye, but is associated with other body and mental features.

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IN SCIEN

MEDICINE

Some Skin Troubles May Be "Skin Diabetes"

➤ BOILS, ECZEMA, sweat gland abscesses and itching skin that fail to clear up with other forms of treatment may be "skin diabetes" and if so will respond promptly to a diet low in sugars and starches, Dr. Erich Urbach, of the University of Pennsylvania Medical School, reports in the *Journal of the American Medical Association* (Oct. 6).

Patients with this condition do not have symptoms of diabetes such as sugar in the urine or abnormally large amounts of sugar in the blood. Dr. Urbach believes that the condition is one in which the skin fails to utilize carbohydrates properly, perhaps because of some interference with the action of insulin involving only the tissues of the skin.

"Skin diabetes," therefore, is in his opinion a suitable term for the condition. Chemical analysis of tiny bits of skin show that in such cases the skin is storing more sugar than normal.

A typical diabetic diet, sometimes with insulin, clears up the skin condition promptly. If the patient goes back to a normal diet, the eczema, boils or other skin disorder reappears.

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CHEMISTRY

Pack Fresh Vegetables In Ice for Vitamin C

➤ PACKING freshly harvested vegetables in crushed ice is the best way to prevent loss of vitamin C during transportation and storage because it combines moisture and low temperature. After three days of storage in crushed ice, Swiss chard, broccoli and lettuce still held most of their original vitamin C, investigations conducted by the Wisconsin Experiment Station showed. Leaf lettuce, after six days of storage packed in ice and held in a cold room had lost less than 10% of its C.

The common practice of sprinkling lettuce or spinach to keep it fresh in retail markets was found to be of little help in saving the C vitamin. Moisture without refrigeration is of no benefit.

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E FIELDS

ORNITHOLOGY

Pacific Island Birds May Become Extinct

➤ MANY SPECIES of Pacific island birds may become extinct because of military occupation, report Dr. Harvey I. Fisher, University of Hawaii ornithologist, and Paul H. Baldwin, U. S. National Park Service, who recently completed a survey of birds on Midway island.

Two species of birds formerly plentiful on Midway already most likely have become extinct, Dr. Fisher and Mr. Baldwin state. The Laysan rail and the Laysan finch, both of which were plentiful on Midway in 1941, have probably been wiped out. The only other known habitat of these species is Laysan island in the Midway group, from which both are believed to have disappeared some years ago.

Other birds, though perhaps not so rare, have also suffered. The "gooney bird", or Laysan albatross, has been reduced to less than half its estimated 1941 population. Whereas there were half a million Bonin Island petrel in 1941, the present population is estimated as 25,000. Only three noddy terns were found on Midway, where 2,000 were believed to exist before the war.

The importation by military shipping of rats which kill off birds; use of large areas for buildings, lawns and walks, eliminating vegetation and cover; and unavoidable slaughter of birds by planes landing and taking off are some of the reasons why military occupation of an island is devastating to bird populations. In addition, birds are unavoidably trapped in barbed wire, old gun emplacements and fox-holes. Bird eggs are also collected for eating.

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CHEMISTRY

Synthetic Tire as Good as Natural Rubber Tire

➤ A NEW synthetic rubber tire for automobiles, claimed as good as natural rubber tires, is made of a special variety of government GR-S-10 synthetic rubber in which a rosin-base soap replaces fatty-acid soap as an emulsifying agent. This is an important factor in attaining better wear, cooler running, and greater resistance to cracking and carcass bruising.

Another factor is the design of the tire. It has a tread that is wider than that of the conventional tire, which makes it roll more squarely and flatly along the pavement. Contrary to popular belief, this is a basic advantage, producing longer and more uniform tread wear, according to F. Ray Campbell, representative of the B. F. Goodrich Company whose engineers developed the new tire. The increased contact area of the tread means greater stability, better distribution of weight, and less scuffing of the tread, he states.

The new tire has a riding bar instead of a center groove, and this, along with other construction, gives it crack-growth resistance more than half again as great as that of comparable standard-design tires, it is claimed by the manufacturers. It is expected that the new tire will be available to the public reasonably soon.

Science News Letter, October 13, 1945

CHEMISTRY

Rubber Extracted By Fermentation Process

➤ RUBBER LOCKED up in the leaves of a tropical vine belonging to the milkweed family can be released through a fermentation process in which bacteria are used, members of the American Chemical Society were informed by a communication from Sam R. Hoover and associates at the Eastern Regional Research Laboratory of the U. S. Department of Agriculture. The paper was sent in for the Society's "meeting-in-print," which is being substituted this year for the regular meeting, called off because of wartime travel restrictions.

The vine, known botanically as *Cryptostegia grandiflora,* has the rubber scattered in the form of tiny globules through the green cells of its large, tough leaves, as well as in the latex vessels. No satisfactory means has ever been found for the mechanical extraction of this rubber, nor is chemical extraction effective as long as the leaves are intact. A decay-producing bacterium, *Clostridium roseum* solved the problem. It broke down the leaf structure and released the cell contents in which the rubber globules were embedded. These were screened out of the debris, then treated with chemical solvents to get out the rubber.

Laboratory tests, as well as incorporation with GR-S synthetic rubber in experimental tires, proved the Cryptostegia rubber to be of good quality.

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CHEMISTRY

Hydrochloric Acid Keeps Canned Vegetables Fresh

➤ VICTORY garden vegetables were kept from spoiling by adding enough dilute hydrochloric acid to make them very sour, in canning experiments carried on at Ohio State University by Prof. R. C. Burrell and three young women assistants, Miss Esther M. Johnson, Miss Beverlee J. Rice and Miss Phyllis J. Sohn. Results are reported in detail in the *Journal of Chemical Education* (Aug.).

The experiments were undertaken in an effort to find some means for keeping vegetables safe from bacterial spoilage and possible development of the deadly botulism contamination, in the face of the war-caused scarcity of pressure cookers. It was known that most bacteria cannot thrive in media of relatively high acidity. Hydrochloric acid was selected because while it is poisonous in concentrated form, in a dilute condition is not only harmless but a normal part of the gastic juice.

When the vegetables were acid enough to discourage spoilage bacteria they were much too sour to eat. This was overcome by stirring in a little baking soda just before preparing them for use.

An added benefit of the acid canning was the retention of most of the vegetables' vitamin content.

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ENGINEERING

Gas-Diesel Engine Has Higher Thermal Efficiency

➤ A NEW engine, developed by the Cooper-Bessemer Corporation, delivers more power for the amount of fuel consumed than any engine heretofore produced, it is claimed. It is a turbo-charged gas-diesel engine. Technically, it has high thermal efficiency, which is the term for the amount of fuel consumption in relation to power developed.

Its thermal efficiency is rated as over 40%, which is a higher record than ever obtained by a steam, gas, gasoline, gas turbine or diesel engine, the manufacturers state. The record was set during routine tests. The best record, heretofore, was established by the diesel engine, which operates usually between a range of 32% and 36%. The highest thermal efficiency claimed for a gas turbine engine is 29%; gas and gasoline engines usually attain up to 25%, and reciprocating steam engines from five to 18% thermal efficiency.

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PSYCHOLOGY

Psychology in Japan

The re-orientation and re-education of the Japanese is a psychological problem. They have not ceased their psychological warfare with the surrender.

By MARJORIE VAN DE WATER

➤ HALF A MILLION women will soon be welcoming returning sons or husbands who might have been mourning their dead except for the expert use of the world's mightiest weapon.

It wasn't the atomic bomb. It wasn't the rocket plane or jet propulsion. It wasn't radar.

Those were all extremely important in defeating the enemy. So were the flame throwers and bombs and bazookas, the parachute attacks and all the other modern devices of war.

But you can defeat an enemy without bringing about his surrender. Surrender is a state of mind. What made the Japanese sign on the dotted line with their army intact? What enabled the United States to "invade" Japan's mainland, welcomed by banquets served by a bowing, saluting enemy, instead of the desperate fighting of a cornered, fanatical foe?

The answer is believed by some U. S. officials to be in a weapon that is neither new nor secret, but which has never before been employed on so effective a scale for such an important goal. It is psychological warfare.

In a sense, of course, all warfare is psychological, because no matter how devastating is the destructive force of military measures they can never achieve their objective until the enemy reaches the point where he is willing to surrender.

Guns Are Silent

The guns are silent now. But the psychological problems remain. The Japanese are now engaged in an active campaign of psychological warfare against us which is not in any way robbed of its dangers by a cloak of ingratiating friendliness. And we will have our own psychological problems in the occupation of Japan. Certainly if we hope to bring about a complete re-education and re-orientation of the Japanese people, we face the greatest psychological problem yet encountered.

The present peace is easily lost if vigilance is relaxed and efforts lag, because the polite smile of the conquered naturally hides a deep smoldering resentment which can be fanned into a widespread outbreak of violence against the conquerors and against authority in general

Success in meeting the problem of how to produce in Japan a spirit of surrender points the way to an effective attack on the job of maintaining the peace.

On the basis of an intimate and accurate knowledge of the minds and behavior of the Japanese people and how they would act in response to action taken by this country, a psychological campaign was mapped out and then followed through to a dramatic conclusion.

A small group within the U. S. Navy, housed in improvised quarters in part of a converted garage, planned the psychological tactics. For the first time in history all the events in a campaign, diplomatic and also military, were dictated by the considerations of psychological warfare.

The goal was surrender without invasion. The priceless booty that was at stake—and that was brought home in triumph—was an officially estimated saving of half a million American lives.

Here are some of the highlights of the knowledge of Japanese psychology and current events that formed the sound basis for the psychological campaign.

1. The Japanese, as a people, are completely helpless without authority, without the presence of someone in command to tell them what to do. If they are fighting, they will continue fighting until they are told to stop. If they are faced with sudden unexpected disaster, they are unable to act even to save their own lives without specific direction.

2. A Japanese man cannot act for himself. Two men cannot come to a decision. Always it takes at least three Japanese to arrive at an important action. It is the fixed habit of Japanese thinking to work in council. For this reason, Japanese action is slow—it takes time to get men together, to discuss the issue, to reach agreement. But they can come to an agreement if ordered to do so.

3. The Japanese would never surrender, man by man, unit by unit, regiment by regiment as the Italians and later the Germans did. Surrender, for Japan, had to come from the top. Comparatively few Japanese soldiers were taken prisoner. Not one officer of the rank of general raised the white flag. Never did an organized group of Japanese soldiers lay down arms and give themselves up.

4. Japanese leaders knew they were defeated at the beginning of this year. An island nation cannot hope to win a war without a fleet. When the Japanese lost their fleet, they lost the war. It did not matter that they had a large Army undefeated. It didn't matter that they had men in China and Manchuria. It didn't matter that Japanese soldiers were strongly entrenched in rock caves in hundreds of tiny islands scattered over the Pacific. Without means of holding these forces together, supplying them, and communicating with them, Japan was lost and the leaders knew it.

5. The Japanese people were completely uninformed about their desperate plight. Even though the Emperor knew that further battle was useless and worse than useless—that each new day of war was taking fresh and profitless toll of Japanese life and property, he could not face his people with a proposal of surrender while they had no suspicion of their defeat.

6. Not only were the Japanese people ignorant of the fate of their fleet and their own helplessness, but they were ignorant of the power of the Allies. Scientific news did not reach them through the fog of "thought control." The atomic bomb must have been the first intimation many of the public had that scientists even hoped to split the atom.

7. Japanese leaders, faced with certain defeat, would be anxious—eager—to find some way to get out of the war. They would welcome any suggestion of how to make surrender seem reasonable to the Japanese people.

8. But the Japanese people are not plain-spoken, they are not direct. To bring about the surrender it would be necessary to speak their language figuratively as well as literally.

In an army of fanatical fighters such as the Japanese, trained from earliest childhood to revere the Emperor as God and to regard death in his service as a great honor and personal surrender as unspeakable disgrace, the difference between certain defeat and the laying down of arms may be very great indeed.

It was brought about by a carefully

planned program of psychological warfare based on thorough knowledge of Japanese character, history, and ways of thinking. Capt. Ellis M. Zacharias, of the U. S. Navy, and the small group that helped him plan this psychological campaign took it for granted that the Japanese leaders are realistic people. They knew that they faced defeat. But they were on the spot; they could see no way to get out of a war which meant only a daily mounting toll.

Capt. Zacharias knew that the objective of his psychological campaign must be to solve this problem for the Japanese. Surrender would have to come from the top, because it is a fixed habit of Japanese minds to be unable to act without orders from above. The Emperor himself must be the one dealt with.

Step by Step

This he did, step by step. As principal tool, he used a series of radio broadcasts in which he spoke in Japanese and also in English. His voice was well known in Japan, for he had been for many years in Japan as attache in the U. S. embassy. But the broadcasts were only one tool. They were backed by military events, carefully planned for psychological effect.

First, Capt. Zacharias reasoned, an emperor who wanted to get his people out of a war must know what leaders would be acceptable to the enemy to negotiate the peace. And so the first broadcast by Capt. Zacharias was filled with names.

They were not suggested as negotiators. In the first place, you don't speak so directly when talking to the Japanese. In the second place, "face" would not permit the Emperor to use or trust men forced on him by the enemy.

And so the wording of the broadcast was like this:

"I have always acted as a friend of the Japanese people and have done everything in my power to prevent the catastrophe which has already begun to envelop your homeland. Those among you who know me personally, and there are many in the highest places, will confirm this fact.

"Admiral Yonai will recall our many conversations after his return from Russia as a language officer. Admiral Nomura Kichisaburo will remember my frank discussions, both in Japan when Admiral Nagano often attended, and on his way to Washington to his last official assignment.

"Mr. Kurusu will know my regret in the loss of his son who as a young boy I often patted on the head. General Matsumoto, Washizu, Teramoto and Hirota will remember my frequent advice. Likewise Mr. Debuchi, Wakatsugi, Horinouchi and the staff of late Ambassador Saito. Your Premier Admiral Baron Suzuki may remember our meeting when he was chief of the Naval General Staff. My impression of him was fully confirmed by his recent sympathetic statement regarding our loss in the death of Franklin Delano Roosevelt.

"And finally their Imperial Highnesses Prince and Princess Takamatsu will recall, when, as their aide-de-camp, I accompanied them during their tour of two months in the U. S. in 1931."

The Japanese reply to this broadcast was equally indirect, but equally pointed. They did not go on the air with any statement about these men. But the Domei news agency immediately came out with the news announcement that Prince Takamatsu was appointed to represent the Emperor at official functions and Admiral Yonai had been appointed to a position of increased authority in the Japanese government. What better indication could we want that Japan was ready to talk terms—and our terms. That was in May, 1945.

What other help would the Emperor need to get him out of the war? Obviously, his people would have to be informed of Japan's military defeat. They knew nothing of this; the truth had been kept from them. This little mission of popular education was thoroughly taken care of by the U. S. Navy and Air Forces in attacks on the Japanese mainland—attacks timed to back up the broadcasts.

The Emperor would need reassurance that "unconditional surrender" would not mean the crushing or annihilation of the Japanese people—a fate worse for them than death in battle. This reassurance was given in the very first broadcast in an official statement by the President of the United States, reiterated over and over again in later broadcasts.

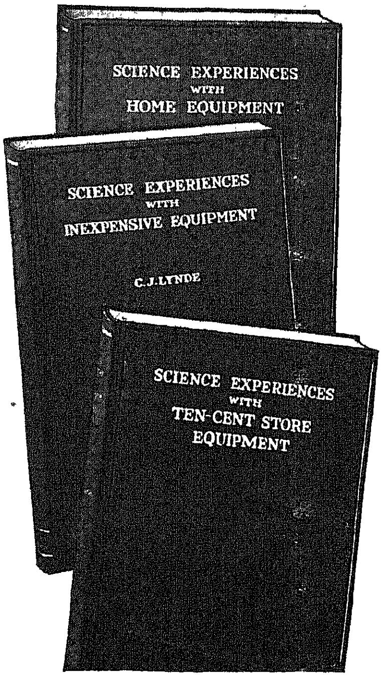
"It means providing for the return of soldiers and sailors to their families, their farms, their jobs. . . . Unconditional surrender does not mean the extermination or enslavement of the Japanese people."

Blame the military leaders, the Emperor was advised—always with subtle indirection. Get rid of them. They are responsible for the catastrophe that has overtaken Japan. They are failures and incapable of leading Japan.

Names and words of patriotic Japanese were mentioned in the broadcasts—men who had advised against Japan's pathway into war. Tell the people about these men, was the suggestion implied.

The Japanese are realistic, the broadcasts stressed. A patriotic Japanese leader is willing to face facts, to acknowledge past mistakes and about-face to pursue a wiser course to save Japan.

The broadcasts provided the Emperor with the means he needed for face-saving before his people. The outcome of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modern wars is determined, Capt. Zacharias told him, not by the bravery of the fighters or the people but by superior "war potential" which means superior industry for making the tools of war. To acknowledge defeat and surrender is patriotic and dignified—to go on fighting when all is lost would indicate lack of bravery and "shallow emotionalism."

Finally, since the Japanese are a historically minded people, and need to have their actions justified by past precedent, Capt. Zacharias provided the Emperor with chapter and verse from Japanese history in which one patriotic leader of the people surrendered honorably to another in order to save his clan from destruction. By surrender, Satsuma was saved to become the most prosperous province of Japan.

Capt. Zacharias also read in full a letter written in 1895 by Admiral Ito to the Chinese Admiral Ting, a personal friend, whom he advised to surrender for the best good of his people.

On July 21, 1945, Broadcast Number 12 went on the air. All that remained was to assure the Japanese that the United States offered unconditional surrender as a humanitarian gesture, that they might assume that it would be the United States who would enforce the formula and insure the peace, that the Atlantic Charter and the Cairo Declaration would apply.

On July 24, Dr. Inouye officially answered that Japan would surrender.

Twelve broadcasts—180 minutes on the air helped to save half a million American lives.

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Now the Japanese guns are silent, but the Japs have not surrendered their weapons of psychological warfare.

The occupation forces entered Japan on an entirely different footing from that in Germany. In Japan, they were received with military bands playing and with radio and press blaring Japanese propaganda.

American correspondents were "received" in Japan by Japanese officials and "taken" to view what the Japanese most want them to see. But first they were put up in the best suite of the best hotel, in rooms reserved for General MacArthur.

Each day brought fresh tear-jerking stories of the "mysterious" effects of the atomic bomb. Japanese "scientists" are said to have investigated the strange deaths of people who went into the area weeks later and then suddenly died as though cursed. It is obvious what the Japanese would like to have stressed in the reports of American correspondents.

Missionaires Invited

Missionaries are being invited to return to Japan but Americans will be suspicious of the Japanese motives in this. Baseball players will probably be urged to visit Japan for remunerative exhibition games soon after the World Series.

The Japanese have done an excellent job of anticipating just what would be ordered by the occupation government and rushing to order these measures themselves.

Freedom of the press and freedom of assembly are to be restored, reports from Japan indicate. A general election is planned. Fraternization between Americans and Japanese is forbidden.

It is anticipated that there will be a wholesale "abolishing" of vicious institutions merely through changing the names to something new with a democratic sound. The Student Mobilization Bureau under the name Physical Education Bureau is no less jingoistic.

But the occupation government may be expected to see through all such ruses. And all these attempts to outdo the conquerors in revising their ways may be turned to good account if we keep alert to the implications.

In Japan there are many individuals, many groups, which are violently opposed to militarism and to the present dictatorial regime. These people are our friends. They need our help. Some have actually been in prison for 15 years. It is only necessary to see that they are now permitted to do what they want to do to rebuild Japan and the tremendous job of re-education and re-orientation will be taken care of for us.

Most important for Japan is a truly free press. And our interpretation of what constitutes a free press may be quite different from the ideas of the Japanese cabinet. The Japanese are a literate people. They read eagerly and widely if they have the opportunity.

Of major importance also is freedom of science. There should be international exchange of scientific information and thought (except the atomic bomb). Japanese scientists, like other scientists the world over, want to have the respect of their colleagues in other nations. The free criticism, or even the anticipation of criticism, from world-renowned scientists will serve to take the racist myths, the thought control, the fantasy and the just plain baloney out of Japanese science and education.

Education, psychologists know, cannot be distributed like vitamin pills which the Japanese might be forced to swallow for their own good. In order to learn it is necessary to want to know. And so education must be a voluntary activity. It can be supervised, but it cannot be effectively enforced. Fortunately, there are in Japan many sound individuals who will welcome the opportunity to teach without being hampered by Japanese militarists. It is only necessary to encourage and support their activity. They may be expected to cooperate with the Americans if permitted to do so.

In the development of a democracy or even the seeds of a democracy, the opinions, the wishes, the judgment of the people are of vital importance. Public opinion polls, based on sound scientific principles of a fair sampling of all groups —age, economic standing, religion, sex and education—will very likely be put into use and wisely interpreted to guide the occupation government and control the Japanese officials. Americans, with their knowledge of the importance of

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H. G. Wells

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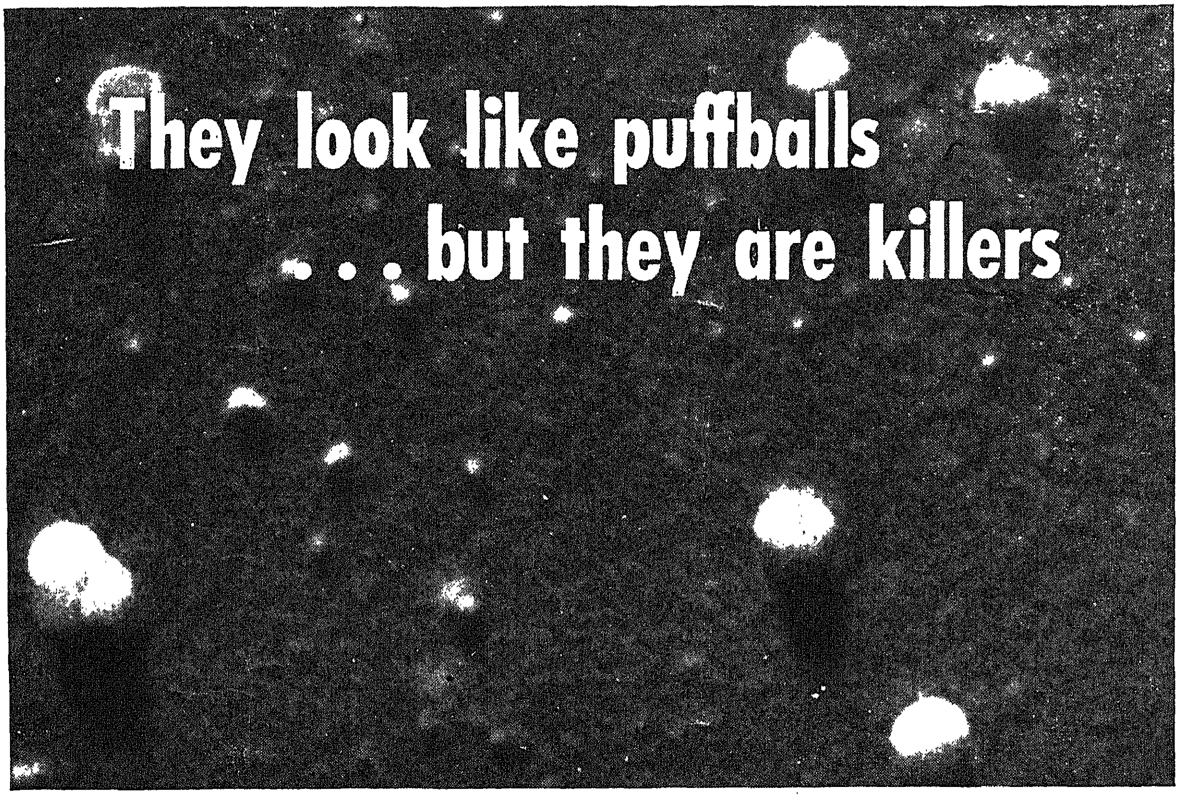
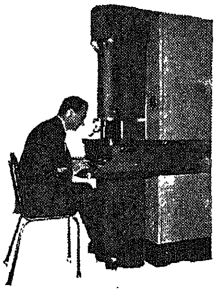


Influenza Virus X 110,000, as seen with the RCA Electron Microscope

To those who remember the deadly epidemic of influenza that followed World War I, this picture has a dread significance . . . for these innocent-appearing bits of woolly blobs are actually influenza-virus particles magnified 110,000 times. This remarkable electron micrograph was made by Dr. Ralph W. G. Wyckoff and Dr. Robley C. Williams at the University of Michigan.



The high magnification, extreme resolution, and great depth of focus, attainable with the RCA Electron Microscope, are very skillfully utilized in this truly unusual picture.

RCA technicians will be glad to discuss with interested parties the possibilities of the RCA Electron Microscope in any contemplated application. We invite your inquiry.

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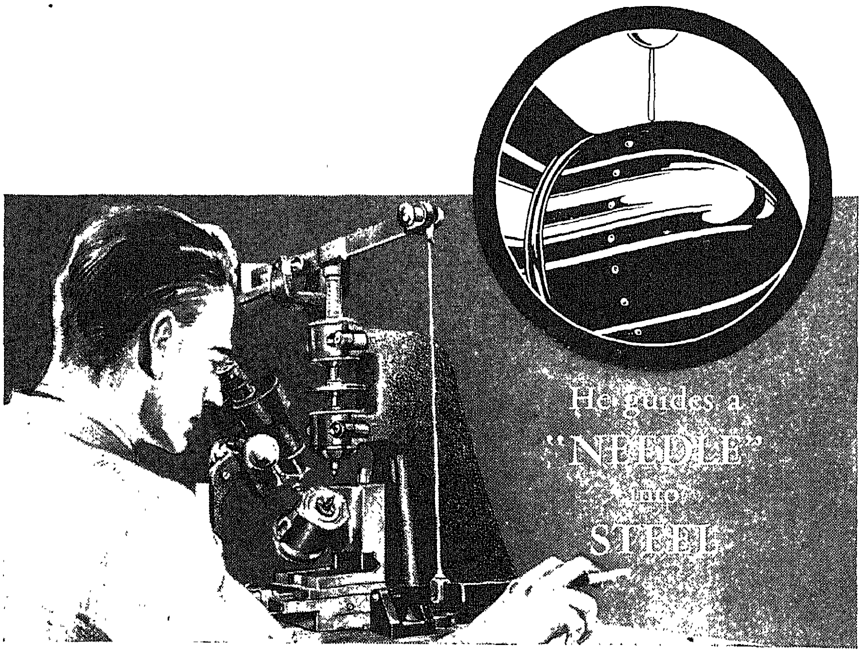
techniques of polling, are not likely to be fooled by "planted" polls with loaded questions, biased sampling or intimidated interviewees. They will beware also of the results of street-corner, amateur sampling of public opinions or judgments based only on the expressions of those who speak English or who volunteer to speak for the whole population.

One danger in thinking about the people of a foreign country, especially one so far away and culturally different from our own nation, is that of assuming that all the people are alike. This is easily avoided by those who know the Japanese, and those who know psychology.

In Japan, as in any large country, the individual citizens include the good and the bad, the educated and the ignorant, the stupid and the intelligent. They have been regimented for many years, it is true, but our hope of eventual re-orientation and successful occupation lies in a recognition that individuals differ. Some of the Japanese will always be our enemies no matter how much "education" they receive. Others, perhaps, have always been our friends.

Science News Letter, October 13, 1945



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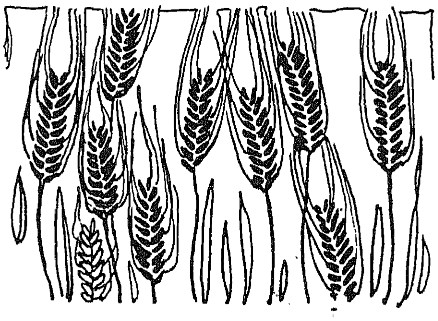
AGRICULTURE

NATURE RAMBLINGS

by Frank Thone



Two Acres Per Head

➤ JAPAN is a nation of tiny, hand-worked farms. We read, with the kind of pity that verges on contempt, that their average size is less than three acres each, and that each one has to support the family that tills it, pay an extortionate rent, and send a surplus of rice or millet to supply urban areas, or perhaps raise mulberry leaves to feed to the silkworms. We think of the broader acres of the American farmer, and tend to feel a bit smug about our better fortune.

But have we the right to feel this way? Has anyone on earth the right to feel spacious and uncrowded, when it comes to food-producing land? Ward Shepard, in his new book, *Food or Famine,* brings us up short with some decidedly arresting facts. According to an estimate of the Soil Conservation Service, he says, there are approximately four billion acres of cultivable and pasture lands on this planet. The world's population is about two billion persons. That divides out to an average of two acres of food-producing land per person. Here in our own country, there are rather less than two acres of plowland per person, not taking pastures and rangelands into account. So we aren't too far a leap ahead of the Japanese peasant: the precariousness of his source of living is simply dramatized by the fact that he is actually domiciled on his scrap of soil.

Moreover, Mr. Shepard warns, we are wasting our patrimony at an alarming rate, despite all our fine talk about conservation during the past two or three decades. Soil erosion, from over-cultivated farms, over-grazed rangelands and over-cut forests, has rendered about a fourth of our once useable soil areas practically valueless and is inflicting progressively increasing damage on about half of what is left. To make money as fast as possible, we Americans are quite literally selling our farms down the river.

Nevertheless, Mr. Shepard is no mere Jeremiah, pessimistically prophesying unavoidable doom. There is yet time, he declares, and socially effective techniques for large-scale salvation of the land have already been invented. The two great nations with the largest areas of temperate-zone land, the U. S. A. and the U. S. S. R., approach the problem in different ways. On Russian collective farms, agronomic experts decide what needs to be done, and the farmers do as they are told. Americans farmers, with a long tradition of rather stiff-necked individualism, certainly would not be so biddable. With us, the democratically organized soil conservation district, hiring its professionally trained advisers, accomplishes the same end. If it becomes necessary to apply coercion to recalcitrant individuals, the moral as well as material weight of a majority vote is behind its actions. So far, this mechanism has been applied only to farm lands, but there is no reason why some modification of it should not be used on the even more difficult management problems of private forest lands.

Science News Letter, October 13, 1945

Graphite, a variety of carbon used as a lubricant, and in so-called "lead" pencils, crucibles and many industrial products, is found in most countries of the world, but much of it is not usable because of poor quality.

The *lima bean,* considered by many as the aristocrat of the bean family and the most delicious of all garden vegetables, is of South American origin but whether from Brazil or Peru is a matter of dispute.

• Books of the Week •

ADVANCING FRONTS IN CHEMISTRY. Vol. 1, High Polymers—Sumner B. Twiss—*Reinhold,* 196 p., illus., $4. A series of lectures sponsored by Wayne University under the direction of Neil E. Gordon, Chairman, Dept. of Chemistry.

THE ART OF CALCULATION—Harry Sticker—*Essential Books,* 256 p., $2. Basic method of arithmetical calculation used by exports.

FOOD OR FAMINE, The Challence of Erosion—Ward Shepard—*Macmillan,* 225 p., illus., $3.

INTRODUCTION TO BIOLOGICAL LATIN AND GREEK—P. H. Yancey—Brooks, F. G., 24 p., paper, 20 cents. 2nd ed., revised. Bios Classroom series, no. 1.

MAN, MORALS AND SOCIETY: A Psychoanalytical Study—J. C. Flugel—*Int. Univs. Press,* 328 p., $4.50.

ORIGINS FROM MYTHOLOGY OF BIOLOGICAL NAMES AND TERMS—P. H. Yancey—*Brooks, F. G.,* 47 p., paper, 20 cents. Bios Classroom series, no. 5.

REPTILES OF THE PACIFIC WORLD—Arthur Loveridge—*Macmillan,* 259 p., illus., $3. The Pacific World series.

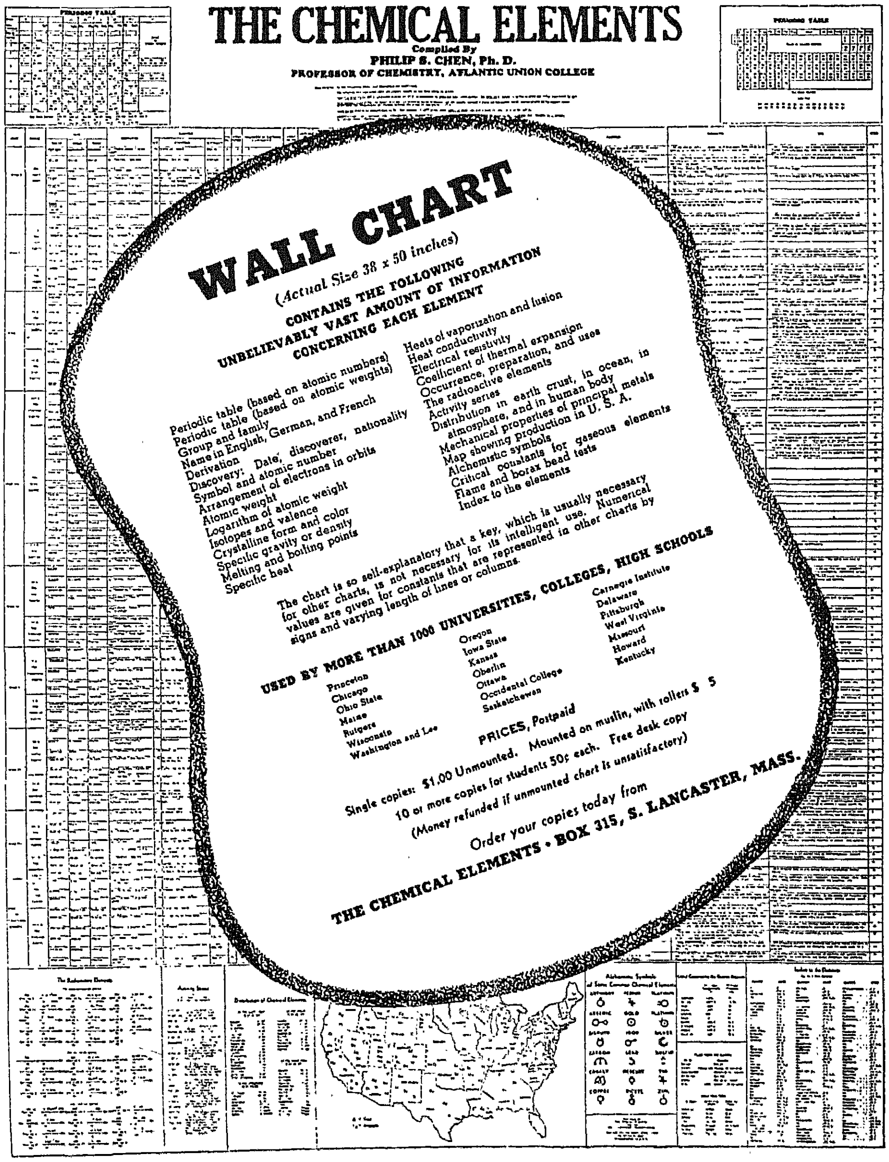
SCIENCE AND THE PLANNED STATE—John R. Baker—*Macmillan,* 120 p., $1.75.

SIXTY MILLION JOBS—Henry A. Wallace—*Simon and Schuster,* 83 p., paper, illus., $1. Cloth ed., $2, published jointly by *Reynal and Hitchcock* and *Simon and Schuster.*

THE TECHNOLOGY OF PLASTICS AND RESINS—J. Philip Mason and Joseph F. Manning—*Van Nostrand,* 493 p., illus., $6.50. Based upon a college course in the Chemistry of Plastics and Resins at Boston University.

WILLIS RODNEY WHITNEY: Pioneer of Industrial Research—John T. Broderick—*Fort Orange Press,* 324 p., illus., $3. Foreword by Dr. Karl T. Compton.

Science News Letter, October 13, 1945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Isotopes and valence
Crystalline form and color
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Occurrence, preparation, and uses
The radioactive elements
Activity series
Distribution in earth crust, in ocean, in atmosphere, and in human body
Mechanical properties of principal metals
Map showing production in U. S. A.
Alchemistic symbols
Critical constants for gaseous elements
Flame and borax bead tests
Index to the elements

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⚙ *HOUSEHOLD GLOVES, made of synthetic rubber, have roughened fingers to assure a non-slip grip on soapy dishes and other slippery objects. Some gloves have a satinized inner finish, and others a fabric lining, to make them easy to pull on and off.*

Science News Letter, October 13, 1945

⚙ *TWIN-READER magnifier, that closes like a pocket knife for convenience, has dual lenses scientifically matched that give third-dimensional vision with true perception of depth. The lenses are of fine optical glass, and the field of observation is triple that of old-type single-lens magnifiers.*

Science News Letter, October 13, 1945

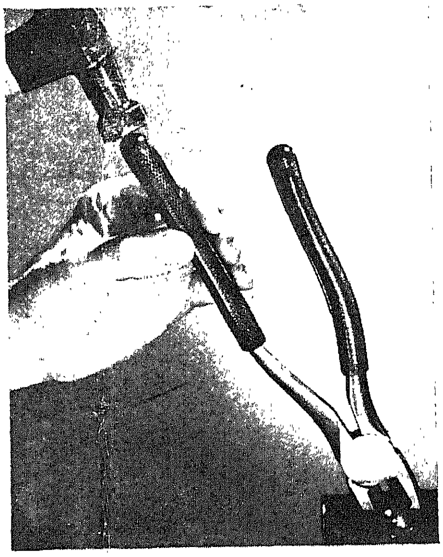
⚙ *GAS TANK cap, for automobiles, is theft-proof and siphon-proof, and requires no lock and key. Conical shaped, it fits all filler pipes, and when installed cannot be removed. Baffles cast in its bottom eliminate bubbling and spilling during filling, and prevent siphoning.*

Science News Letter, October 13, 1945

⚙ *STORAGE compartment in the back of a passenger seat in a railroad car utilizes none of the space between the seats and is large enough for personal articles within easy reach. Its hinged front, when opened, swings downward to form an adjustable writing table.*

Science News Letter, October 13, 1945

⚙ *PLASTIC SLEEVES for ordinary pliers shown in the picture provide a good grip for slippery gloves or bare hands in cold weather. They are hammered onto the handles without cracking or splitting. Being of non-conducting material they provide insulation for work on electric lines.*



Science News Letter, October 13, 1945

⚙ *ELECTRONIC device, a sensitive pressure instrument to measure gas or liquid pressure, utilizes the principle that the electrical characteristics of a wire filament change with a physical strain. It contains a very fine filament wire bonded to a hollow metal core against which the pressure is exerted.*

Science News Letter, October 13, 1945

⚙ *EJECTOR SOCKET, to shoot out used photoflash lamps employed with a camera synchronizer when the picture is taken, relieves the photographer of removing the hot lamp by hand. The flash bulb, when pushed into the socket, compresses a spring which is released at will by a push-rod.*

Science News Letter, October 13, 1945

⚙ *COMB, BRUSH and mirror combination is similar to the ordinary hairbrush with a handle, but has a row of teeth along one side of the brush which passes through the hair ahead of the bristles. The mirror is inside a hinged back on the brush.*

Science News Letter, October 13, 1945

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Question Box

BIOLOGY

How dangerous is ultraviolet light to the sight? p. 227.

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What species of Pacific island birds may become extinct? p. 233.

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What is the new principle of the automatic radar camera? p. 229.

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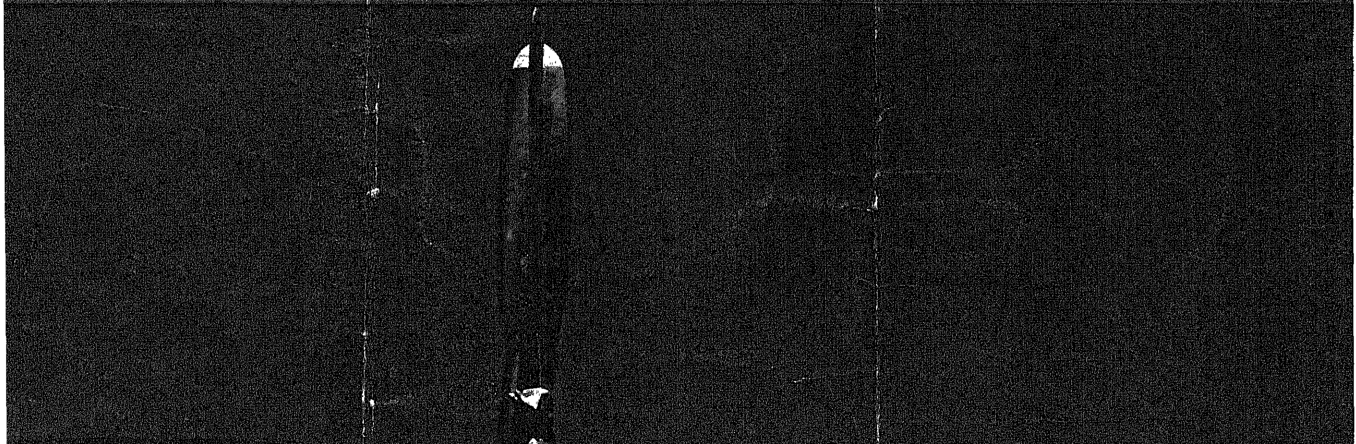
THE WEEKLY SUMMARY OF CURRENT SCIENCE • OCTOBER 20, 1945



Reversible Pitch

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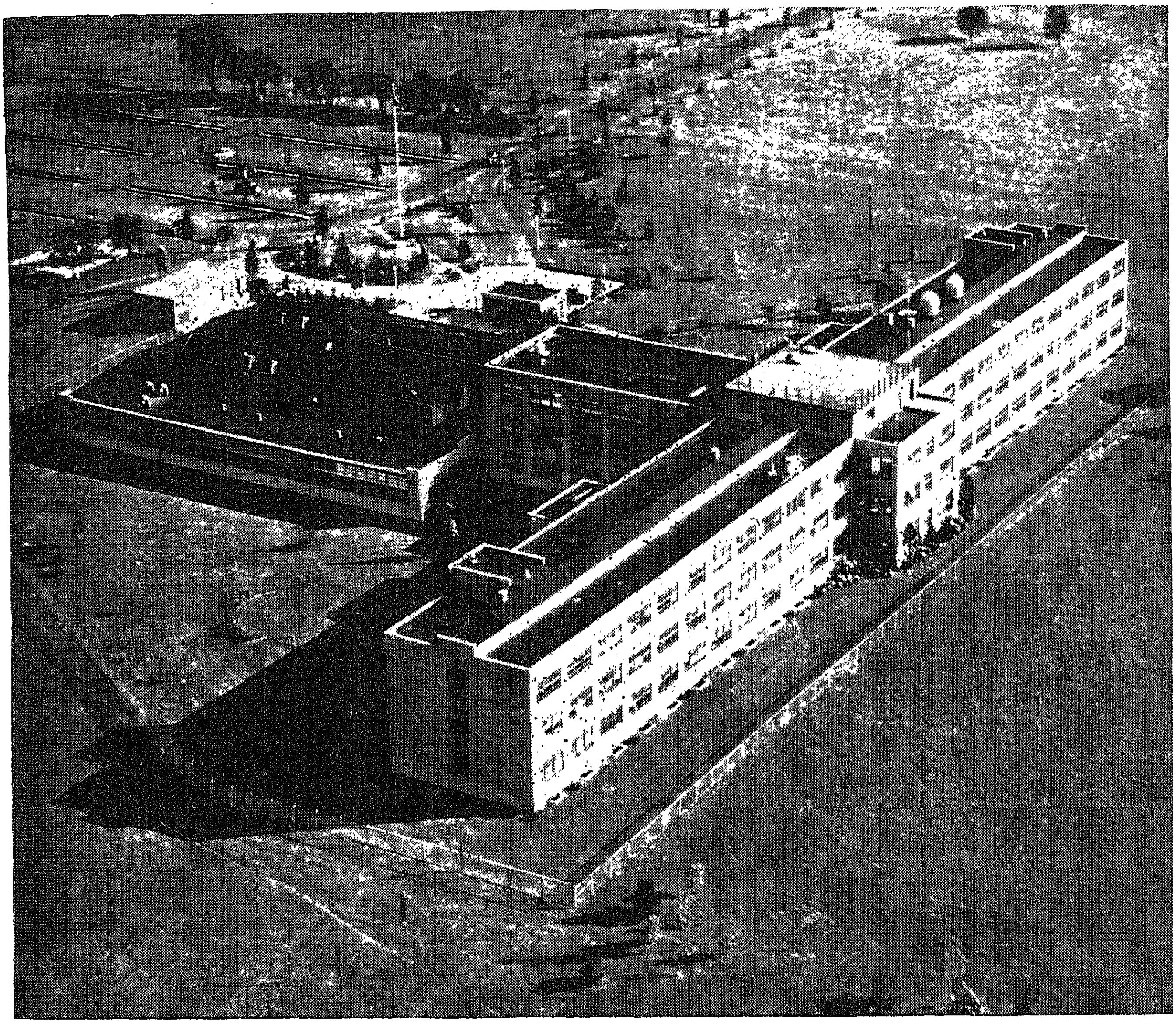

RCA Laboratories—Center of Radio and Electronic Research

RCA Laboratories at Princeton, N. J., are far more than one of the most modern and best-equipped laboratories ever built. It is a community of scientists, research men and technicians—each a top man in his field—each working with the other—contributing wherever and whenever his specialized knowledge will help.

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For just as the RCA electron tube, television receiver, radio, or the Victrola, is stamped by the RCA trademark, so does the product itself bear a stamp of experience and research that gives RCA pre-eminence in the field of radio and electronics.

Radio Corporation of America, RCA Building, Radio City, New York 20. *Listen to The RCA Show, Sundays, 4:30 P. M., Eastern Time, over the NBC network.*

PIONEERING

Scientists and research men who work in RCA Laboratories made many vital contributions in helping to win the war through application of radio, electronic, radar and television techniques. Their skills now are devoted to peacetime applications of these sciences.

At RCA Laboratories the electron microscope, radar, all-electronic television (featuring the projection system for the home) and many other new instruments of radio, including hundreds of new electron tubes, were developed to improve and to extend the services of radio around the world.

RCA

RADIO CORPORATION of AMERICA

GENERAL SCIENCE

Back to College

Grants of $2,500,000 to speed return of war scientists to college research and teaching. Program of Research Corporation to cover five years.

➤ SCIENTISTS who have been doing war research on atomic bombs, radar, jet propulsion, and many other weapons will have the chance to get back promptly to peacetime research and teaching in colleges and universities through $2,500,000 in grants offered by the non-profit Research Corporation of New York, which develops inventions assigned to it by public-spirited inventors.

The five-year program was announced by Dr. Joseph W. Barker, acting president, who has returned to his duties with the Corporation and with Columbia University from service as Special Assistant to the Secretary of the Navy.

It will result in 100 to 200 grants of $2,500 to $5,000 each year in order that talented young scientists, engaged for the most part in war research in uniform or as civilians, will be able to undertake at universities and colleges research of peacetime importance in pure science, especially chemistry, physics, mathematics and engineering.

The first grants will be made in a few weeks by a special committee of eminent scientists from industrial and university laboratories. The committee is composed of Acting President Barker who is also Dean of Engineering at Columbia University; Dr. Thomas H. Chilton, director of engineering for duPont; Dr. William D. Coolidge, X-ray consultant for General Electric Co.; Timothy E. Shea, manufacturing engineer of Western Electric Co.; Dr. Lloyd P. Smith, associate research director of Radio Corporation of America; Col. Stafford L. Warren, professor of medicine at the University of Rochester; and Dr. Robert R. Williams, inventor of the synthesis of vitamin B_1 and coordinator of research of Research Corporation.

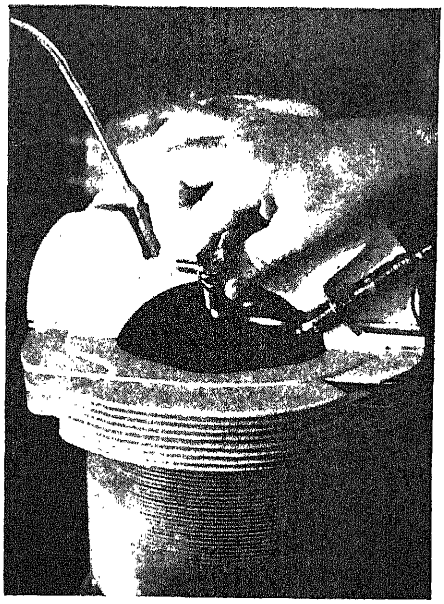
Grants will be made to the institutions, but awards will be based primarily upon the demonstrated ability of the men who will conduct the researches and contribute to the teaching program of the school.

"For the past four or five years," said Dr. Barker, "the Government, through the Office of Scientific Research and Development, the National Defense Research Council, the Army, the Navy, and the Air Force, has supported a vast research and development program into which has been drawn the great majority of the most competent university research men. Already the demobilization of these research projects is under way. When their war jobs are finished many of these talented young scientists should be going back to college laboratories and lecture rooms to train and inspire the next generation of science.

"War conditions have greatly disturbed our educational institutions by diversion of talented members of their faculties into war research, by drawing off faculty and students into military service, by utilizing educational facilities for military service training programs and by interrupting sources of financial support.

"Research budgets have been drastically curtailed, especially in the smaller institutions, which in many cases have not had opportunity to undertake Government research on a substantial scale. The financial strength of many institutions also has been impaired by the depression and the war conditions which followed. Now new burdens are thrust upon them as young men from the services return to resume their interrupted training.

"Research Corporation's program of special postwar grants will round out the plans that are being made for the most effective and most prompt return of the war-engaged scientists to peacetime fundamental and applied research," Dr. Barker explained. "The Rockefeller foundation has already announced a comprehensive plan of pre-doctoral fellowships which will return to college former graduate students who left their studies and researches for war research. Current government legislation and proposed bills being considered by Congress will aid the return to college of students whose scientific and technological education was interrupted by the war. Research Corporation grants will assist colleges and universities in building research-minded staffs which will help train the students returning to colleges from the war, as well as the future contingents of students from our secondary schools in future years."



B-29'S SUCCESS—In the new Bendix-Stromberg direct fuel injection system, which equipped the Superforts that dropped the atom bombs, the fuel is pumped under pressure directly into individual engine cylinders, entering via the stainless steel fuel lines and the nozzle shown at the upper left. Spark plug is at right. The technician's hand holds the fuel spray nozzle at the point where gasoline is sprayed into the cylinder.

The grants are made possible by the fact that during the war years research programs that would be normally supported by Research Corporation grants have been laid aside in order to free men and facilities for war research.

Research Corporation was begun in 1912 with the gift, through Dr. F. G. Cottrell, of patent rights on electrical precipitation, which is used for removing dust, fume and mists from industrial gases and from the atmosphere.

Science News Letter, October 20, 1945

GENERAL SCIENCE

AAAS to Hold Meeting In St. Louis in March

➤ AMERICAN scientists will get together for their first big general postwar meeting in St. Louis, on March 27 to 30, 1946, Dr. F. R. Moulton, permanent secretary of the American Association for the Advancement of Science, announced. A tremendous volume of scientific information, dammed up by war-imposed necessity for secrecy as well as by lack of opportunity to report either in print or by word of mouth, is expected to be released at this four-day gathering.

The American Association for the Advancement of Science is the great general society to which most American scientists belong. Total membership exceeds 27,000, and its meetings, which are held jointly with those of many of the 190 specialized scientific societies and groups affiliated with it, usually attract crowds of from 3,000 to 5,000 research men and teachers.

In normal times, the Association has held its meetings twice a year, one during the Christmas holidays and one in early summer. However, like all large societies, the Association has kept meetings rather strictly in abeyance during the war. A meeting was held in Dallas, Texas, during the Christmas week immediately after Pearl Harbor, because it had already been scheduled. It was deemed advisable to hold another meeting in Cleveland in the fall of 1944, but that was the only strictly wartime gathering of the Association's members. With war restrictions on travel now removed, a heavy attendance at St. Louis next spring is expected.

Science News Letter, October 20, 1945

PHYSIOLOGY

Bone Twists Affect Gait

The characteristic way in which a person walks is determined during the period when he learns to walk. Knowledge is useful in correcting bad foot posture.

➤ CERTAIN twists in the leg bones, developed during the years when children are learning to walk, largely determine the gait or characteristic way in which a person walks, it appears from studies reported by Dr. Herbert Elftman of Columbia University in the *American Journal of Physical Anthropology*, (Oct.).

The bones making up the upper and lower parts of your leg develop their twists independently. If you "toe in," the combination of these twists are in one direction; whereas, if you "toe out," the twists are in the opposite direction. Scientists, especially orthopedists, are interested in learning how each leg bone affects walking, because this knowledge is useful in correcting bad foot posture.

It is almost impossible to measure the twist in a leg bone during life, even with the X-ray. Dried bones are not entirely satisfactory either, because it is impossible to tell at what angles they were connected with one another. For example, if you straighten your leg and try toeing in and out, you will notice that the whole leg from the hip downwards turns with the foot. Thus it is necessary to study the leg as a whole. To solve this problem Dr. Elftman resorted to studying legs that have been taken off at the hip. All that he needed to do in such cases was to expose enough of the joints at the hip, knee and ankle to determine their axes. From the angles which these joints make with a standard plane he could determine the amount of twisting in each bone.

From Dr. Elftman's findings, there appears to be little relationship between the twist in the thigh bone and that in the lower leg bones. On the other hand, the twisting of the lower leg bones as seen in the ankle joint has a definite relationship to foot position. Dr. Elftman points out also that the twists in the adult bones are quite different in degree from those present at birth. Although the evidence is incomplete, it seems to indicate that the adult condition develops during the years when children learn to walk.

Science News Letter, October 20, 1945

ELECTRONICS

Electronic Device Measures Speed of Baseball

➤ THE SPEED of the baseball between the pitcher's hand and the catcher's mitt needs no longer be a guess; it can be measured, and timed accurately down to a ten-thousandth of a second. Electronics is the answer; a versatile electronic device does the job. The same device can measure the speed of the shutter on a camera or the rate of travel of a bullet from a rifle.

In measuring the speed of a moving body, two photo tubes with light sources aimed on them are set up with a known interval between them and directly in the line of flight of the moving object. The light sources shining on the photo tubes create two beams of light. A meter begins timing when the moving object breaks the first beam of light and ceases timing when it breaks the second. It records the time in thousandths of a second.

In measuring shutter speed on a camera, the time interval meter clocks time consumed by one shutter operation at any speed setting. A photo tube picks up light and transposes it to voltage pulse first when the shutter opens and again when it closes. The dial records the interval. This measurement is taken without any mechanical attachment to the camera which might retard its movement. The device was used during the war to determine time interval in checking high-speed aerial cameras.

Science News Letter, October 20, 1945

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MEDICINE

Transplanted Hearts

Have been put in warm-blooded animals with no ill effects. Were planted onto the neck and put "in circuit" with the host's blood circulation system.

➤ SUCCESSFUL transplantation of hearts into warm-blooded animals, such as rabbits, cats and dogs, has been accomplished by Prof. Nikolai Sinitsin of the Gorky Medical Institute, Moscow.

The heart was transplanted onto the host animal's neck and put "in circuit" with the host's blood circulation system. No ill effects were observed. Prof. Sinitsin is now carrying out long-term experiments for the purpose of keeping animals with two hearts alive as long as possible. At the same time he and his associates are conducting experiments for transplanting hearts into the abdomen instead of the neck.

The work is expected to provide a valuable method for studying various problems of heart physiology and treatment of heart disease.

"The transplanted hearts retained their own individual rhythm which as a rule is slower than that of the host's heart," Prof. Sinitsin states in a report written for the Soviet Scientists' Anti-Fascist Committee.

Rabbits, cats and dogs easily withstood the transplantation operation with an "infinitesimal" loss of blood, Prof. Sinitsin reports. There was no visible effect on the work of their own hearts.

The operated animals did not show any shortness of breath, spasms or excessive excitation after the operation. They reacted normally to all external exciters, such as light, sound and pain.

The transplantation of hearts in warm-blooded animals followed earlier work in which Prof. Sinitsin succeeded in transplanting hearts in cold-blooded vertebrates. In these studies, the transplantation consisted in completely replacing a frog's heart with that of another frog. Some of these frogs lived more than six months with a borrowed heart and did not show any differences in behavior from normal frogs. In spring both males and females which had been operated on went through a normal nuptial period which ended with spawning.

"Microscopic examination of the blood vessels that had been sewn together showed that they had knitted completely and that the structure of the heart muscles was normal," Prof. Sinitsin says in describing the results with the frogs.

"When there are two hearts beating in the breast of one frog, they have entirely different relations to the animal's body. The host's own heart has both neural and humoral connections with his body through the blood while for the first 35 to 40 days the transplanted heart has only humoral, chemical connections. The nerves of the host then begin to grow onto the transplanted heart. It is also possible to study the action of a number of heart medicines on the organisms with two hearts.

"There is undoubted interest in the question of the length of time taken by a transplanted heart to take root in the host's organism, when the host's nerves grow onto it and what happens to nerve ganglions inside the heart.

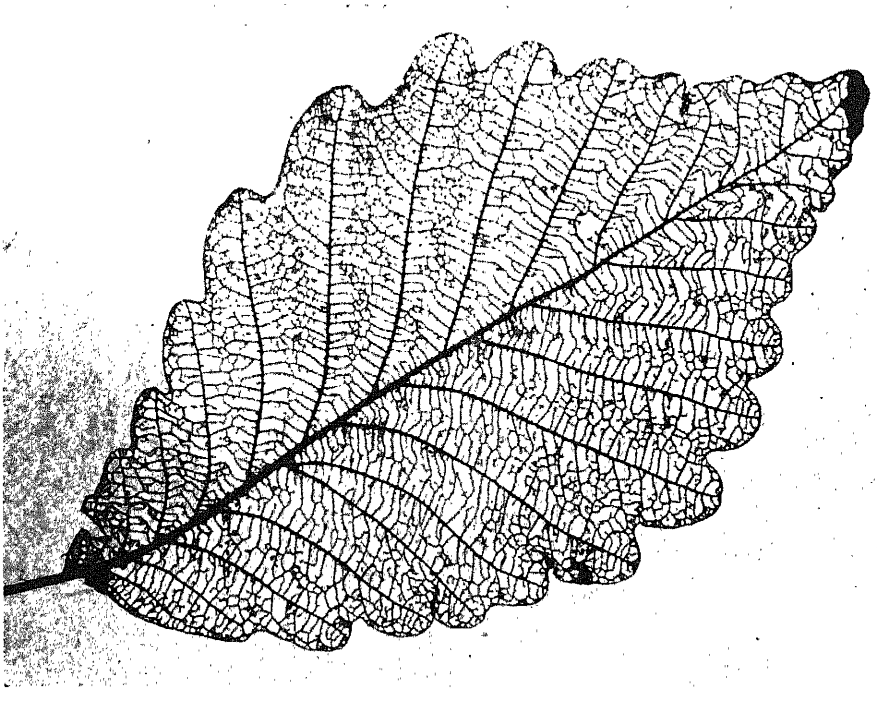
"The success of these experiments on cold-blooded animals led me to repeat the experiments on rabbits, cats and dogs. As a preliminary measure we carefully developed methods of joining blood vessels of warm-blooded animals. The method we developed is exceedingly simple and rapid, taking 20 to 30 seconds to perform.

"For the first series of these experiments we developed methods of transplanting the heart onto necks of these animals. In this series of experiments the second heart had only its right half joined into the host's blood circulatory system. The left half of the heart was not 'in circuit'. This system we called the 'semi-clinical' method.

"Observations showed that the heart worked well and would live for a long time. The heart retained its own rhythm and had no adverse effect on the blood pressure of the host or his ability to perform work.

"For the second series of experiments after a long search for the correct method we transplanted hearts onto necks of hosts with both halves arterial and venous in circuit with the blood circulatory system. This gave us a complete second heart 'clinical transplantation' as we called it."

Science News Letter, October 20, 1945



LEAF SKELETON—This is the skeleton of a chestnut oak leaf produced by the larval form of a saw-fly. When the larvae hatch out they feed on the pulp of the leaf, leaving the skeleton intact. Three leaves often attacked by this insect include the elm, poplar and chestnut oak. Photograph by George A. Smith, of Quarryville, Pa.

PHYSICS

Prevent Atom Dangers

World must work out new international cooperation to harness atomic energy to world usefulness and prevent international catastrophe.

By GUDRUN TOKSVIG
Science Service Correspondent

➤ THE FATE of humanity, now that enormous explosive energy has been released from the atom, depends upon the ability of the peoples of the world to cooperate in avoiding common dangers, Dr. Niels Bohr, leading Danish scientist and Nobelist who worked on the American development of the atomic bomb, declared in Copenhagen, Denmark.

"We have left that time far behind us when each man could pick up the nearest stone for self-defense," Dr. Bohr said. "We have also reached that place where the security offered the citizens of a nation by collective defense arrangements is altogether inadequate. Perhaps there is no defense possible against the new powers of destruction, and it depends upon a world-wide cooperation to prevent use of the new sources of energy for purposes which do not serve humanity as a whole. However, the possibility for an international control with this purpose in view may be said to be secured by the gigantic, special character of the efforts, which are unavoidable in manufacturing the new terrible weapon."

"It is evident," Dr. Bohr emphasized, "that no control can be effective without free access to full scientific information and unless opportunity is given to exercise international control in all undertakings which could be catastrophic if not controlled.

"Such safeguards necessitate elimination of all barriers which hitherto have been considered necessary to protect national interests," Dr. Bohr said. "These now are a hindrance for common security against dangers without parallel. It is evident that handling this difficult situation will demand the goodwill of all nations, but it must be understood that we here have to do with something which can become a deathly challenge to civilization itself. A better background to handle such a situation can hardly be found than the serious wish to seek a firm basis for the world's security, which so unanimously has been expressed by all the nations which have been able to defend the elementary human rights through their united efforts. An agreement upon this vital question will create confidence and harmonious relations between nations which can hardly be overestimated.

"In solving this great problem, scientists the world over will be able to offer the most valuable services. The strands which have been woven together through scientific collaboration constitute some of the strongest ties between individuals of different nations, but the entire scientific community will no doubt unite their strongest efforts to make the world clearly realize the values that are at stake, and to appeal to all humanity to listen to the warning that has been given.

"Every man of science who has helped in the work to lay the foundation of the new development is ready to help in every way he sees clear to find a solution of humanity's present crisis, which will be worthy of the ideals for which science has struggled through the ages."

Science News Letter, October 20, 1945

CHEMISTRY

Chlorine Dioxide Produced In Lab in Small Amounts

➤ CHLORINE DIOXIDE, now an important bleaching and oxidizing agent, can be produced in the laboratory in small quantities by a method that depends upon the reaction of accurately metered dry chlorine with substantially dry powdered sodium chlorite, the American Chemical Society reports in *Industrial and Engineering Chemistry,* (Oct.).

The report is by W. S. Hutchinson and R. I. Derby of General Mills, Inc., Minneapolis, and covers three methods developed by them for producing chlorine dioxide, using these chemicals, for experimental purposes in bleaching flour in their laboratory. The method recommended depends upon the quantity and purity desired.

One method, which can produce up to a tenth of a gram of chlorine dioxide in a one-liter flask, yields chlorine dioxide and chlorine in the effluent gases. For many purposes the excess chlorine is of slight or no consequences when compared to the oxidizing power of the chlorine dioxide produced, they said.

The second method, to produce larger quantities, consists of introducing the chlorine slowly into a mixing chamber and then in a continuous stream of air through a column filled with the dry flaked sodium chlorite. The action is instantaneous.

In the third method, to produce chlorine dioxide in still larger quantities, a generator is used which consists of two or more glass tubes, filled with technical grade sodium chlorite flakes, connected in series with glass tubing. Chlorine and air are introduced at the bottom of the first tube and pass through the others in series. The effluent gases are then conducted to a mixing chamber where they are diluted to any desired concentration with air.

Science News Letter, October 20, 1945

AERONAUTICS

Planes Can Land Without Touching the Ground

➤ EXCEPT for servicing and overhauling, light planes, using the Army's new portable plane handling system, now need never touch their wheels to the ground for landings and takeoffs.

Known as the Brodie System after its creator, Capt. James H. Brodie, this method permits flight operations in marshes, jungles, mountains and other terrain formerly inaccessible to aircraft unless landing strips were installed. The entire apparatus may be carried in cargo planes, parachuted to earth and set up in less than 24 hours.

A taut steel cable, supported by four 65-foot masts, forms this mid-air "landing strip." Suspended from the cable are three nylon loops, any one of which may be engaged by a landing hook mounted on the upper surface of the plane's wing. The comparatively slow-flying planes "hook" the six-foot loops and slide down the cable until braking power is applied. Takeoffs are accomplished by reversing the process. The planes are raised by derricks and secured to the cable by a releasable stirrup. Under its own power, the plane moves slowly down the cable until flying speed is reached. A lanyard in the cockpit is pulled, releasing the stirrup, and the plane is airborne.

Weighing less than six tons, the rig is considered practical for planes up to 5,000 pounds and with modifications may be used on cargo or landing vessels.

Science News Letter, October 20, 1945

CHEMISTRY-ENTOMOLOGY

New Mosquito Repellent

NMRI 407, Navy's newest and most potent insecticide, held mosquitoes at bay for over five hours in laboratory tests. Is used like a lotion.

➤ NMRI 407, the Navy's newest and most potent mosquito repellent, is now being tried out under field conditions in Guatemala. In laboratory tests, it held mosquitoes at bay for over five hours. The average time to the first bite was 322 minutes, Lt. Michael Pijoan reported.

Associated with Lt. Pijoan in the mosquito repellent studies at the Naval Medical Research Institute were Lt. (j.g.) L. A. Jachowski, Jr., and Pharmacist's Mates 3rd class H. J. Gerjovich and M. L. Hopwood.

For men working or fighting in the jungle, mosquito repellents are important in spite of the development of the potent insecticide, DDT. The latter brings sure death to many insects, but it kills slowly. A chemical rubbed on the skin which scares the mosquito away before it bites would give good protection against malaria, yellow fever and dengue which are spread by mosquitoes, to say nothing of the comfort in mosquito infested regions.

Because fighting mosquitoes in the jungle is quite a different proposition from protecting yourself from a few bites when you sit outdoors on a summer evening, the Navy's medical scientists developed a "sweat test" for the new repellents. Tropical conditions, with a temperature of 90 degrees Fahrenheit dry bulb, 80 degrees wet bulb, were maintained in the cage full of hundreds of mosquitoes. The scientists and their assistants smeared some repellent on one of their arms and then sat with it inside the cage, holding a clock on the mosquitoes to time the first bite.

To make sure that the repellent would work under conditions of dripping sweat as well as "pool sweat," the kind that stays on the skin instead of dripping off, the testers engaged in vigorous exercise for some of the tests.

During the war dimethyl phthalate was the most commonly used insect repellent, but its repelling time was only 80 or 90 minutes. NMRI 201, announced by the Navy several months ago, had a repelling time of about five hours in the laboratory. When used by several groups in the jungle, this time was about twice as long. Better ones have since been developed, among them 407 and 448.

The latter has a somewhat shorter repellent time than 407, 289 minutes on the average in laboratory trials, but it is much cheaper, costing less than one dollar per pound.

These two chemicals, which even now may only be known by their numbers in the long series tested at the Naval Medical Research Institute, are hydrogenated naphthols. Mixing them with another chemical, 2 phenyl cyclohexanol, prolongs their repelling time.

The repellents were developed in the course of more than two years of work during which many chemicals were screened and the most promising subjected to further study. After the naphthol derivatives were found to be apparently effective, a whole series of them was synthesized and subjected to various chemical manipulations until repellents that "are final and have solved the problem" were developed.

These new repellents are odorless and colorless liquids. They are used like a lotion.

The Department of Agriculture, Pan American Union and Office of Inter-American Affairs have cooperated and assisted in various phases of the work on the new repellents.

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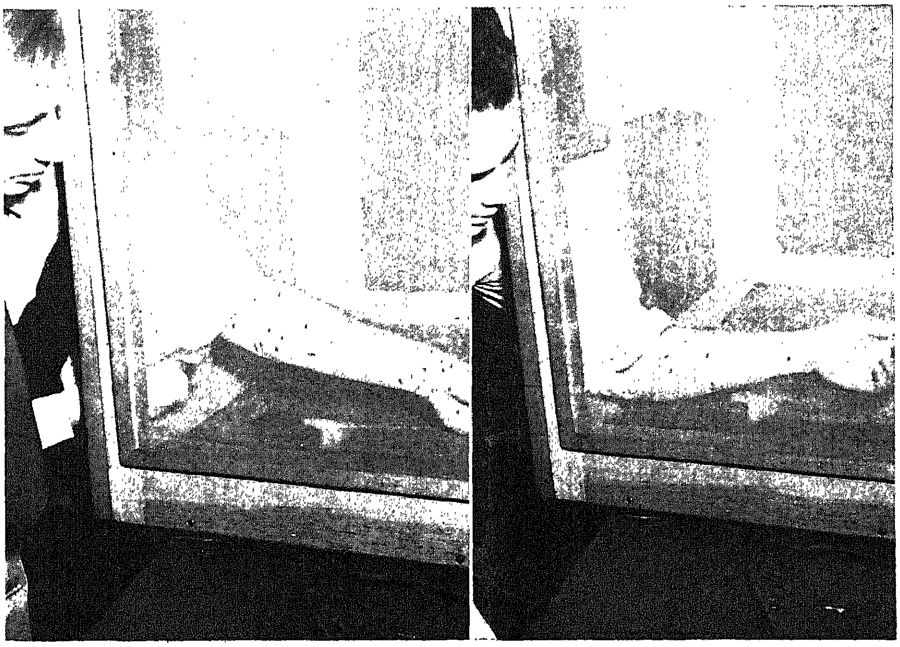

MOSQUITOES DISAPPEAR—The man's arm on the left has not been protected with the new repellent and the pests cover his arm; on the right, the arm has been covered with NMRI 407.

AERONAUTICS

Seamless Enclosure For Airplane Pilot

➤ THANKS to a special electric welding machine developed during the war, pilots and bombardiers on heavy fighting planes were enclosed in seamless plastic domes which gave them an unobstructed view out of the planes. By use of the machine, two large plastic sheets were quickly fused into a single sheet, the Libbey-Owens-Ford Glass Company now reveals.

The machine applies electrical heat to the two edges to be united by means of strip heaters. It controls temperature, timing and pressure automatically, and with the machine the welding of the sheets is put on a mass production basis, replacing former slow hand methods.

Science News Letter, October 20, 1945

Penned *turkeys* gain weight more rapidly if fed grass clippings.

OCEANOGRAPHY

Mile-Deep Record Sought By Underseas Explorer

➤ EXPLORING the sea bottom one mile straight down, in a massively constructed sphere equipped with wheels, is the ambition of Otis Barton, underseas explorer, now in Bermuda to make preliminary arrangements. He hopes to be able to make his preliminary dives by the summer of 1947.

Record for human descent into the ocean is at present held by Dr. William Beebe of the New York Zoological Society, who in 1934 descended in his bathysphere to a depth of 3,028 feet, or about three-fifths of a mile. The reel which Dr. Beebe used is still in Bermuda, and Mr. Barton is arranging for its use.

There is a difference in purpose between Dr. Beebe's bathysphere and Mr. Barton's apparatus, which he calls a benthoscope. The former was used in studying free-swimming creatures in the water at great depths; the latter is intended for work among the fantastic animals that crawl on the ocean bottom, or are even grown fast to it, like plants. Hence the wheels on Mr. Barton's submarine vehicle. It will not attempt movement under its own power, but will be towed by a cable from a ship.

Mr. Barton had a project for the construction and use of a benthoscope on foot just before the war, and had to suspend action on it until the close of hostilities.

Dr. Beebe, who is also in Bermuda at present, is collecting apparatus which he intends to use in shallow-water undersea exploration off the coast of Venezuela.

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MEDICINE

Large Doses of Vitamin D May Be Harmful

➤ PERSONS who take all types of vitamins indiscriminately and in large amounts are warned by Dr. Jere M. Bauer, of the University of Michigan Hospital, that vitamin D in large doses may be harmful and should be taken only under the direction of a physician.

The first death of an adult as a result of vitamin D intoxication with metastatic calcification, that is, the deposition of calcium in the kidneys, heart, and arteries causing the death, is reported by Dr. Bauer. In this particular case, the woman, who was suffering from arthritis, had been administering the vitamin to herself without a doctor's prescription, and had taken at least 100,000 to 500,000 units per day for a year.

The lay person who gives vitamin D to himself, Dr. Bauer said, is usually ignorant of toxic symptoms. When taken in excess of tolerance this vitamin produces characteristic symptoms consisting of loss of appetite, nausea, vomiting, diarrhea, muscular weakness and soreness, fatigue, frequency of urination and headaches. If these symptoms occur, administration should be stopped or the dose reduced.

The intoxicating dose depends upon several factors and varies in different individuals and at different times, Dr. Bauer said.

In the case reported, the total amount of vitamin D consumed appears to be larger than in previously reported children's cases with fatal intoxication. If, however, the dose is calculated in units per kilogram of body weight, it is seen that the dose was rather small and was far below the amount usually considered the toxic level for humans.

Concentrated vitamin D preparations, Dr. Bauer concluded, should be considered as potentially toxic drugs and should be taken only on the advice and under the supervision of a physician.

Science News Letter, October 20, 1945

ANTHROPOLOGY

Skull from Africa Is More Man-Like Than Supposed

➤ A NEW restoration of the skull of an ancient animal intermediate in physical characteristics between a man and an ape shows it to have been less ape-like, more man-like, than preliminary studies indicated. The creature, called *Plesianthropus* (Greek for "almost man"), represented thus far by skull fragments, brain cast and a few teeth, was discovered near Johannesburg, South Africa, by Dr. Robert Broom, well-known anthropologist who has done much work on the fossil primate remains of that region.

The present restoration, made by Dr. William K. Gregory and Dr. Milo Hellman of the American Museum of Natural History, is not intended to be the final one: too many parts are still missing. But so far as it has been made, on the basis of casts and minutely detailed measurements sent to this country by Dr. Broom, it takes an intermediate position between apes and men.

Details regarding the new restoration are published in the *Journal of Physical Anthropology,* (Sept.)

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IN SCIEN

PHARMACOLOGY

Ergot Successfully Grown Under Tropical Conditions

➤ ERGOT, a fungus drug widely used in obstetrical medicine, has been successfully propagated artificially under tropical conditions in the province of Bengal, India, J. C. Saha and S. K. Bhattacharjee of Presidency College state in a report sent to the English scientific journal, *Nature,* (Sept. 22.) Present world supplies of this drug come principally from wild sources in Spain and Portugal. If the experiments in India can be followed up by successful commercial-scale production, India may eventually have ergot for export after supplying home needs.

Ergot is made from a parasitic fungus that invades the tissues of plants belonging to the grass family, forming long, dark masses of fruiting bodies in place of part of the grains in the normal head. These fruiting masses, dissolved and purified, are the source of commercial ergot.

In the experimental propagation, four small plots of ground were planted in rye. When the grain was in flower, a suspension of ergot spores in sterile water was sprayed over them. Shortly thereafter signs of infection appeared on the plants, and in due time large grains of high-quality ergot were produced.

Ergot cultivation has been tried out on an experimental basis in England, Wales and Australia, but the present tests are believed to be the first to be attempted in a tropical country.

Science News Letter, October 20, 1945

AERONAUTICS

Propellers Enable Plane To Land on Short Runway

See Front Cover

➤ THE REVERSIBLE PITCH propellers of the B-32 Bomber, shown on the front cover of this SCIENCE NEWS LETTER, enable the plane to land on a shorter runway and increase its maneuverability during ground operations. They are the largest-diameter propellers installed on any production airplane.

A complete story on the B-32 appeared in the August 4 issue of SCIENCE NEWS LETTER, just after the details of its construction were released.

Science News Letter, October 20, 1945

E FIELDS

CHEMISTRY

Surplus Cotton to Make Stronger Currency Paper

➤ SURPLUS COTTON, one of the biggest of American economic headaches for the past couple of decades, is booked to strengthen the country's finances in a new and most literal way. Officials of the Department of Agriculture state that surplus stocks of short-staple cotton, up to 50,000,000 pounds, will be diverted for use in the direct manufacture of paper for use in dollar (and larger) bills, in Victory bonds, insurance policies, etc.

Paper containing cotton fibers is especially tough and long-lived, and is considered especially desirable for uses involving a lot of handling and folding, as well as preservation for long periods.

Because of the present government-supported high price of cotton, incentive payments to paper mills using this surplus are planned, to offset the difference between cotton price and the lower prices of rags and clippings commonly used for like purposes.

Science News Letter, October 20, 1945

BIOCHEMISTRY

New Antibiotic Comes From Wound Bacteria

➤ A NEW ANTIBIOTIC, or germ-checking substance of the penicillin type, has been discovered by a group of three researchers at the College of Physicians and Surgeons, Columbia University, Balbina A. Johnson, Herbert Anker and Dr. Frank L. Meleney. (*Science*, Oct. 12.)

It was first observed that certain rod-shaped bacteria isolated from wound infections exerted an inhibiting effect on other bacteria grown in the same laboratory dishes. A pure culture of these bacteria in broth was made, the living cells filtered out, and the clear fluid tested against other bacteria. When a number of these failed to grow in the presence of the fluid, it seemed evident that an antibiotic substance was present, and work was begun toward its concentration and isolation.

The discoverers have given their new antibiotic the name bacitracin. It is effective under laboratory conditions against a number of trouble-making bacteria belonging to the so-called gram-negative group, especially members of pus-forming, blood-poisoning streptococci and staphylococci, and also the germs of gonorrhea. Tried out on living animals, it has proved able to protect guinea pigs against gas gangrene and mice against one type of blood poisoning.

Tests on human beings have been made with extreme caution so far, but in cases where it has been injected under the skin of human volunteers it has caused no harm, and it has "given encouraging results" against local hemolytic streptococcal and staphylococcal infections. The results have been comparable to those obtained in the same class of cases with penicillin.

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AERONAUTICS

Planes Outlined For Sonic Speeds

➤ THE SILHOUETTE of the plane of the future is foreshadowed in the carefully formulated curves on which patent 2,385,845 was granted to George S. Schairer of Seattle. These outlines are intended to meet conditions imposed by speeds on the order of the velocity of sound. Most notable thing about them, to the layman's eye, is the lack of camber in the wing cross-section; all surfaces, lower as well as upper, tend to be convex. Patent rights are assigned to the Boeing Aircraft Company.

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ICHTHYOLOGY

Carp Sent from U. S. To Stock Trinidad Waters

➤ A SHIPMENT of 800 fingerling carp has been sent by the U. S. Fish and Wildlife Service, to stock lakes and streams in the neighborhood of the American air base on Trinidad, off the northern coast of South America. The carp is an exceedingly adaptable and prolific fish, and even a small planting like this has a good chance of becoming established.

Introduced from Europe, the carp has never found much favor in this country. It is close to the bottom of the American market in order of preference as a food fish, and sportsmen generally consider it a pest. One virtue is grudgingly conceded to it: carp will survive in waters too polluted for any other species. Yet many peoples elsewhere in the world are very fond of it, and it has a long and honorable table history. Roman patricians used to have private carp ponds at their country villas, so that the fresh-caught fish could be carried directly to the kitchen.

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ENGINEERING

Smoke from Locomotives Abated by Steam-Air Jet

➤ LITTLE SMOKE will belch from coal-burning locomotives if they are equipped with steam-air jets properly designed and applied with adequate mufflers, it has been found by recent studies and field tests. The effectiveness of the steam jet in abating smoke has been known for years, but because of poor design of equipment has given unsatisfactory results in the past.

A report on the studies and tests was given during the recent meeting of the Cincinnati section of the American Society of Mechanical Engineers by R. B. Engdahl of Battelle Memorial Institute, Columbus, and E. D. Benton, fuel engineer of the Louisville and Nashville Railroad Company. These two men have worked on the smoke-abatement problem for two years, one in the laboratory and the other in the field, and have experimented with about 350 engines.

As a result of investigations by Mr. Engdahl, made in 1943, the values of some heretofore uncertain design features were discovered. These include steam-air entrainment ratios when steam pressure, nozzle and air tube diameters were varied over a range of practical values. Two years ago the two men undertook to develop for the locomotive a practical muffler and a method of control which would be automatic and also vary the quantities of overfire air in relationship to the amount of coal burned.

"In no sense of the word," the investigators stated, "should it be assumed that the steam-air jet is a complete substitute for a good fireman. Neither working independently of the other is able to do a satisfactory job at all times. When they complement each other they are an unbeatable team, even under adverse conditions."

Science News Letter, October 20, 1945

ENGINEERING

John Fritz Medal Awarded Dr. Zay Jeffries

➤ LEADERSHIP in solving problems affecting the production, conservation, substitution and scientific appraisal of metals and alloys during the war has won for Dr. Zay Jeffries, vice president of the General Electric Company, the 1946 award of the John Fritz Medal. Classed as the highest award in engineering, this medal is bestowed by four leading engineering societies.

Science News Letter, October 20, 1945

PHYSICS

Control of Atomic Power

Scientists who have been engaged in research on the bomb at Oak Ridge, Tenn., urge that finding a way for international control is the only solution.

This is the full text of a statement on the future of atomic energy prepared by a group of scientists engaged in research on the bomb at Oak Ridge, Tenn., laboratory. It is an analysis of the problem that is now being considered by Congress and the world.

➤ THE DEVELOPMENT and use of the atomic bomb has introduced an important new element into world politics and has created a situation fraught with grave danger for our nation and the world. Many of the scientists who have been working on atomic bombs as a necessary military measure in time of national peril did so with misgivings concerning the ultimate repercussions of such a discovery. Consequently, they have been thinking about this situation for a considerably longer time than was possible for the public. We feel that it is our duty to present to the public the basic facts concerning the atomic bomb and their implications for United States foreign policy. Only by a full realization of these facts can the citizens of this country intelligently participate in making decisions that the unleashing of atomic energy compels us to make. If wrong decisions are made, it may mean the destruction of our cities, horrible death for millions of our people, and possibly the end of our nation.

We propose to discuss this problem by analyzing possible courses of action for our government.

No Change in Present International Relations

Alternative I

Many Americans believe, either after serious consideration or because of inadequate information, that no special change in our national policy is necessary. Arguments supporting this view are that the atomic bomb does not change the basic causes of international friction and war, that it is not a development of sufficient magnitude to change the nature of warfare, that an effective defense is sure to be found, and that moral pressure and the fear of retaliation will prevent the use of atomic bombs or prevent war altogether.

Importance of the Atomic Bomb

The primary feature of the atomic bomb is its tremendous destructive power. The newspaper accounts of the destruction of Hiroshima and Nagasaki are adequate for an appraisal of the present destructiveness. By using more bombs, larger bombs and more efficient bombs it will be possible in the near future to completely destroy the bulk of the population, industry and military strength of any nation within a few weeks. Moreover, aviation and rocket developments might enable this to be accomplished within a few hours, without possibility of effective retaliation. Alternately, strategic locations may be mined in advance by agents of foreign nations. A factor of such extreme destructiveness cannot be neglected in formulating our foreign policy. By constituting a serious threat to the safety of every nation, it intensifies the causes of friction and of war.

Possibility of Specific Defense

In spite of the adage, "to each offensive weapon there has been found a defense," we as scientists can offer no hope of a specific defense against the atomic bomb. The only immediate defensive measures are retaliation, counter-offensive or "preventive" warfare, but these will not restore the ruins of our cities or revive the millions of our dead. Dispersal of population and industry over wide areas or underground can reduce the efficiency of atomic bomb raids, but cannot be considered an adequate permanent defense.

Moral Sanctions

Moral considerations did not prevent the use of atomic bombs against Japan, but it might be argued that the population at large was not consulted in this decision. It is evident, however, that the Allied peoples have, to a large extent, approved the decision subsequently. In time of war, moral sanctions have never prevented the use of any weapon, no matter how terrible. Moreover, those having control over the use of atomic bombs may not be subject to moral pressure of the world in general.

Fear of Retaliation

In the past, fear of retaliation has never been a deterrent to aggressors who thought they had a chance to win. Fear of being subjected to atomic bomb attacks may, in fact, enhance the possibility that a nation will itself use them as a preventive measure.

As a result of these considerations it is evident that the world situation is definitely and considerably altered by the introduction of the atomic bomb, and that this factor must be given major consideration in our foreign policy.

United States Supremacy In Atomic Warfare

Alternative II

. Many people feel that the security of the United States can best be preserved by maintaining supremacy in atomic warfare. They propose that we keep the secret of making atomic bombs, that we seek to corner the strategic materials, that we produce more numerous and more deadly bombs, and disperse our population and industries.

Keep It Secret

Those who advocate that the secret of the atomic bomb be kept mislead our people rather than other countries. *There are no longer any fundamental secrets about the atomic bomb.* The government has made public the broad outline of the discovery and methods which led to success. The remaining "secrets" are scientific and engineering details. It would be foolish to suppose that scientists and engineers in other countries would not be able to redevelop at least one of the methods we have used or develop new methods. It took the Anglo-Americans three years to achieve the transformation from the laboratory to the plant scale. Working with the knowledge that this *transformation has actually been achieved,* even those nations with lesser resources than those of the United States will be able to produce atomic bombs within two to five years.

A very dangerous consequence of a policy of secrecy is that while spurring other nations to develop atomic bombs, by withholding detailed information from the majority of our own scientists we will artificially channel and sterilize the further development of nuclear physics and chemistry in our own country.

U. S. Control of Raw Materials

It has been suggested that a way to monopolize atomic bombs is for the Anglo-Americans to control the raw materials necessary for their fabrication. The world-wide distribution of uranium ores does not permit us to achieve this control unilaterally, except by conquest. Before the war there were known uranium deposits in Canada, Belgium, Czechoslovakia, and Russia. Other deposits have undoubtedly been discovered since. It would be foolhardy to rely on the assumption that we, alone or together with Britain, can deprive the rest of the world of access to enough uranium for the production of atomic explosives.

Bigger and Better Bombs

If we cannot hope to *monopolize* atomic power, cannot we make our future secure by producing more and better bombs than the rest of the world?

Producing more and better bombs may be necessary for what security it does give during the next five years. However, we want to warn emphatically that more and better bombs cannot provide us with lasting security. Because of the tremendous potential destructiveness of atomic bombs, and because of the industrial and population concentration of the United States, having more and better bombs is no defense. *Once a nation possesses a certain minimum number of bombs there is no great advantage in having more.* In a few years, a nation with a small number of atomic bombs carried by rockets or planted as mines in our cities, could in a few minutes destroy most of the industrial resources of the United States and much of its population.

Furthermore, if we have more and better bombs, another nation may fear, justifiably or not, an attack by us, and deem it necessary to attack first.

Decentralization

The only known possible defense to existing atomic bombs is the dispersal of industry. By not presenting single targets of sufficient concentration, the effect of atomic bombs can then be reduced. However, there is no reason to doubt that in the future, atomic bombs of sufficient number and destructiveness can become available so that decentralization of industry will be only a partial defense. This would also be a difficult and costly program, resulting in a severe economic dislocation and disorganization. Furthermore, it is doubtful whether the United States could carry out a program of decentralizing industry and population without exercising totalitarian powers which would destroy both democracy and free enterprise.

Immediate World Conquest

Alternative III

If we reveal no more information to other nations, the United States may maintain leadership for a few years. It is almost certain that after five years all of the great powers will, if not prevented by force or agreement, possess atomic bombs in such number, size and efficiency that raids can produce tremendously more destruction than that inflicted on Hiroshima and Nagasaki. Science can promise no defense against such raids. Because of the industrial concentration of the United States and the congestion of our cities, we are especially vulnerable to such attacks and it is entirely possible if we do not decentralize our industries, that most of our industrial potential could be wiped out by such raids in the first ten minutes of war.

This means that after five years the United States cannot rely for its security upon producing more numerous and more deadly atomic bombs. This knowledge has led some to propose that the United States insure its security by forcibly preventing other nations from producing atomic bombs. Since no nation would peacefully consent to our suppression of their development of atomic power, this *course of action means that we must conquer the world within the next five years,* before the other nations of the world achieve equality in atomic power. At the present stage of atomic bomb development, such world conquest would be neither quick nor certain. Clearly, such a policy is against the democratic tradition and expressed views of the American people. In fact, it is hard to see in what way such a course of action differs from that of the Nazis.

International Control Of Atomic Power

Alternative IV

International control of atomic power is another alternative that has been widely proposed. No specific plans have been prepared, and we do not intend to offer one here. We recognize that any such plan involves many difficulties, and may require that in order to preserve the peace of the world, we forego some potential peaceful applications of atomic power and some phases of our national sovereignty. The alternatives are clear. If we ignore the potentialities of atomic

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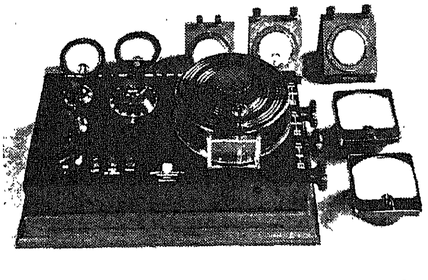

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warfare, in less than a generation we may find ourselves on the receiving end of atomic raids. If we seek to achieve our own security through supremacy in atomic warfare, we will find that in ten years the whole world is as adequately armed as we, and that the threat of imminent destruction will bring about a "preventive" war. If we recognize that our present leadership in atomic power can last at the most several years, and we attempt to dominate the world, we will find ourselves immediately involved in another and greater war in violation of our democratic moral code and with no assurance of victory.

In view of the disastrous nature of these alternatives, we must expend every effort to achieve international cooperation and control as the only real and possible long-term solution.

We strongly urge the people of the United States and their leaders to think about, and find a means for, the international control of atomic power. The United States must exert its leadership to promote world peace. The people of the United States, together with the peoples of the rest of the world, must demand that their leaders work together to find the means of effective international cooperation on atomic power. They must not fail. The alternatives lead to world suicide.

Science News Letter, October 20, 1945

MEDICINE

Artery-Cutting Operation Relieves Migraine Headache

➤ AN ARTERY-cutting operation that brings relief, apparently permanently, in one type of migraine headache is reported by Dr. Samuel B. Nadler, of Tulane University School of Medicine, in the *Journal of the American Medical Association*, (Sept. 29).

The particular headache comes in periodic attacks of throbbing pain, frequently "unbearable," over the right or left temple or both. The pain may radiate over a larger part of the head. Stomach and intestinal upsets often accompany the headache. Dizziness and the visual disturbances that come in some cases of migraine were not present with the headaches, Dr. Nadler reports.

Pressing with the fingers on the temporal artery on the side of the headache abolished the throbbing pain and most of the continuous dull ache that patients also suffered. Injecting a local anesthetic into the tissue around the artery brought relief, often within one minute, which lasted from several hours to several days.

More prolonged relief, two to 11 months so far, was achieved by the operation in which the artery was cut and tied. The operation was successful in five of eight patients whom Dr. Nadler has seen with this type of headache during the past year. The other three had less frequent attacks and preferred to have the injections of local anesthetic instead of the operation.

Science News Letter, October 20, 1945

AERONAUTICS

Great Increase In Aviation Courses

➤ AMERICAN youth, long air-minded, has become increasingly so during the war, and additional millions of students of both sexes will be enrolled in high school and college aviation courses this fall.

Since last October more than $38,000,000 worth of aircraft equipment has been turned over to non-profit schools in an Army Air Force project. Additional obsolete instruments, engines and complete planes will be available to schools in the next few months, through the Education Disposal Section of Reconstruction Finance Corporation.

An estimated 96% of American colleges and universities now recognize aeronautics as an elective science, and about half accept it as a laboratory science for entrance requirements.

The Civil Air Patrol, now a part of the Army Air Forces Training Command, with a membership of 80,000 cadets and 55,000 senior members, wing commands in each state, groups, squadron and flight units in more than 1,000 cities and towns, can adequately train students for flight personnel in postwar commercial aviation.

Science News Letter, October 20, 1945

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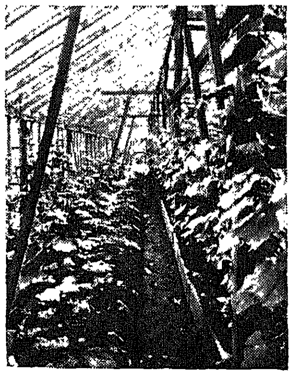
Outwitting the weather

How science copes with Old Man Weather is illustrated by these ideas and devices from General Electric laboratories.

How high are the clouds? A ceilometer measures this for airmen. How wet is the weather? Hay can now be stored in barns before it is dry, with a new hay-drying system with G-E control. And one G-E laboratory makes weather—with or without rain, wind, sleet, snow—to test G-E turbo-superchargers.

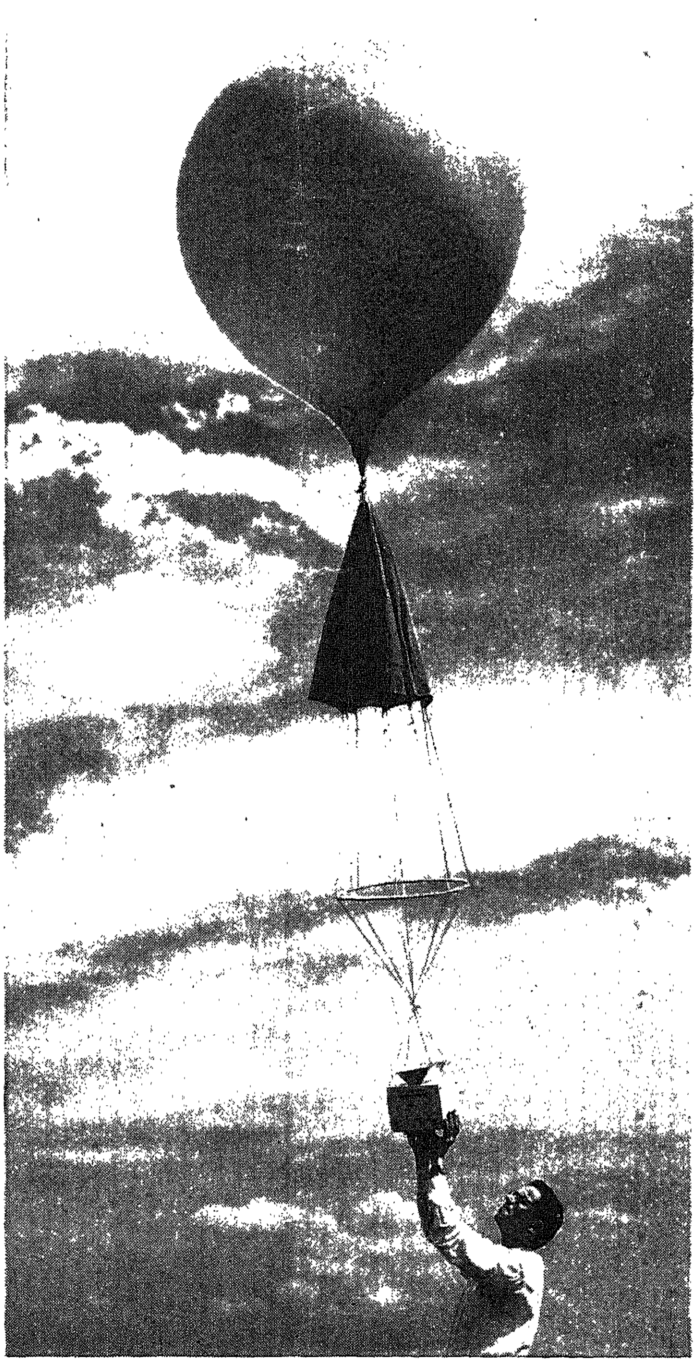
On this page are a few more examples of the way General Electric research and engineering are being devoted to this phase of human comfort and health. *General Electric Company, Schenectady, N. Y.*

Cloudy but bright. When clouds darken the sky, lights come on in this schoolroom. No one has to remember; a General Electric automatic light control with an "electric eye" keeps constant watch, safeguards young eyes by turning on the lights whenever needed.



Cucumber magic. Vines in electrically heated soil (right) grew twice as tall, and bore one month earlier. A heating cable, developed by G-E engineers, is buried in the soil and thermostatically controlled. More than 15,000 commercial growers use G-E soil-heating cable.

Spring weather. Cool, mountain-top comfort in your bedroom, or anywhere else in your house, will be provided by G-E air conditioning units. Nor have G-E engineers forgotten winter problems; they have applied G-E research and engineering to home heating systems, too.



Weather detective goes aloft in the small box suspended from the balloon. Some 12 miles up the balloon bursts, and the box is parachuted back to earth. On the way up, this electronic device, called the G-E Stratometer, gives a running commentary on the weather—temperature, humidity, air pressure—and sends this information back to earth by radio signals. The information gathered by the G-E Stratometer can be used to help predict weather.

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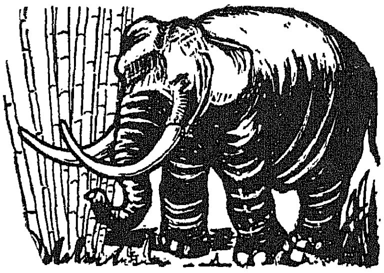
ZOOLOGY

NATURE RAMBLINGS

by Frank Thone



Postwar Perils

➤ GREATEST dangers brought by the war to the animals of the Old World's warmer lands will come now, after the soldiers have stopped shooting. It is not known yet how much damage was done to the wild beasts of the jungles by the conflicting armies that clashed in their tangled depths. Probably, however, the direct destruction was not very great. A number may have been killed by chance bombs and shells or by stray bursts of machine-gun fire. Occasional antelope or wild pigs may have been shot by troops for fresh meat. But the animals, knowing the forest better than the human strangers could ever hope to, were probably able to slip away from the scenes of fighting and hide until the noises stopped.

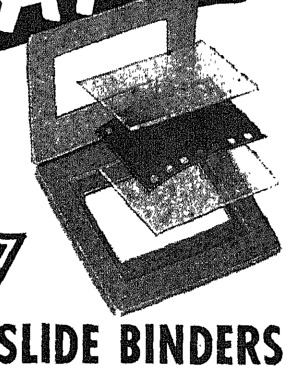
However, now that men have stopped shooting at each other, some of them will want to relax by going a-hunting. We can expect greatly increased hunting pressure on surviving wild-animal populations, now that air travel to the remotest corners of the earth has become commonplace. True, governments controlling the remaining big-game lands are much more conservation-minded than we Americans were a couple of generations ago when we massacred the bison and the pronghorn. But we can expect the animals to be hunted right up to the bag limits—and considerable effort to be exerted to extend those limits.

An even greater danger threatens. Some of the great game areas will probably be opened up to agriculture and grazing by the end of the present century. Means for making life in the tropics safer and more comfortable were being worked out even before the war, and their development was greatly hastened under the necessities of the conflict. DDT may rid great stretches of Africa of the dreaded tsetse fly, bearer of sleeping sickness to man and the equally deadly nagana to animals. And where man takes his cattle and horses in, elephant and antelope and zebra and giraffe must depart, just as deer and elk and bison departed from most of our own continent.

There is an even graver threat, of a disaster that may overwhelm not only the game animals but the very ground they and their domesticated rivals walk and graze on. So-called civilized man has made a very bad record as a destroyer of soils by over-cultivating, over-cutting and overgrazing, just to get more money. But to certain native peoples cattle are not a means to wealth, they are wealth itself: a man's standing is not reckoned in dollars but in cows. Such peoples almost always over-graze their pastures whenever they get a chance—and disaster dogs their heels. Unless new lands opened up in the tropics are administered with scientific wisdom and the firmest of discipline, neither game nor livestock will long survive to enjoy them.

Science News Letter, October 20, 1945

The temperature at which *dried egg* is stored is extremely important in saving flavor and cooking quality; stored at temperatures below 60 degrees Fahrenheit, dried whole egg retained its original quality characteristics for a year.



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• Books of the Week •

➤ THE GEOLOGICAL origin, climate, resources and people of Pacific islands formerly mandated to Japan are presented by William Herbert Hobbs in FORTRESS ISLANDS OF THE PACIFIC. The volume contains 83 original maps and diagrams and 24 drawings from photographs taken by the author. It is a publication of particular interest at this time because some of these islands may remain possessions of the United States. (*J. W. Edwards*, $2.50.)

Science News Letter, October 20, 1945

➤ THE DEVELOPMENT of mathematical ideas from their simple beginnings to their modern complexity in science, engineering, aeronautics and navigation are traced in an interesting readable book, THE RIVER MATHEMATICS by A. Hooper. It can be read for pleasure, or for pleasure and profit. (*Henry Holt*, $3.75.)

Science News Letter, October 20, 1945

➤ BOTH THE chemistry and the practical utilization of plastics are treated in the TECHNOLOGY OF PLASTICS AND RESINS, by Dr. J. Philip Mason and Dr. Joseph F. Manning. It is a book for those who have had introductory courses in general and organic chemistry. (*Van Nostrand*, $6.50.)

Science News Letter, October 20, 1945

➤ EXTENSIVE information for tool engineers, millwrights and factory managers is contained in MACHINE TOOL GUIDE. Its 780 pages include drawings, dimensions, specifications, and important data on machine tools, prepared with the help of 61 of the most important manufacturers. The guide was prepared by Tom C. Plumridge, Roy W. Boyd, Jr., and James McKinney, Jr. (*American Technical Society*, $7.50.)

Science News Letter, October 20, 1945

• Just Off the Press •

AMERICAN PHARMACY, 1945—Rufus A. Lyman, M.D., ed.—*Lippincott*, 540 p., illus., $8. A comprehensive work which will serve well the needs of the student and of the teacher in Schools of Pharmacy.

ELECTRIC MOTORS AND GENERATORS: Related Drives, 1945—E. S. Lincoln—*Essential Bks.*, 381 p., illus., $3. This book covers direct and alternating current motors of all kinds.

ELECTRICAL MEASURING INSTRUMENTS: Measurement and Surveys, 1945—E. S. Lincoln—*Essential Bks.*, 284 p., illus., $3. This book covers operating principles of all types of industrial electric measuring instruments.

ELECTRICAL PROTECTIVE EQUIPMENT AND POWER-FACTOR CORRECTION: Fire Protection and Fire Fighting Equipment, 1945—E. S. Lincoln—*Essential Bks.*, 242 p., illus., $3.

INDUSTRIAL ELECTRIC LAMPS AND LIGHTING, 1945—E. S. Lincoln—*Essential Bks.*, 342 p., illus., $3. This book completely covers every type of industrial lamp with detailed instructions for their use.

OBSERVATIONS AND RESULTS IN PHYSICAL OCEANOGRAPHY, 1945—Dept. of Terrestrial Magnetism—Scientific results of cruise vii of the Carnegie during 1928-1929 under the command of Capt. J. P. Ault. Oceanography—1-B—*Carnegie Institution*, publication no. 545, 315 p., paper, $3.

PLANT LIFE OF THE PACIFIC WORLD, 1945—Elmer D. Merrill—*Macmillan*, 295 p., illus., $3.50. One of the Pacific World Series, under the Auspices of The American Committee for International Wild Life Protection.

PLASTER OF PARIS TECHNIQUE: In the Treatment of Fractures and Other Injuries, 1945—T. B. Quigley—*Macmillan*, 107 p., illus., $3.50.

THE STORY OF LINEN, 1945—William F. Leggett—*Chemical Pub.*, 103 p., $2.75. An authentic and concise history of linen compiled in one volume.

TOMORROW'S HOUSE: How to plan your Post-War Home now, 1945, George Nelson and Henry Wright, eds.—*Simon & Schuster*, 214 p., illus., $3. This book tells you also how to remodel and how to make the best use of the latest materials, equipment and appliances.

WHAT THE INFORMED CITIZEN NEEDS TO KNOW, 1945—Bruce Bliven and A. G. Mezerik—*Duell*, 377 p., $3. An informed round-table discussion of every great issue facing the United States and the world today.

Science News Letter, October 20, 1945

To Maintain the Integrity of Hepatic Activity

Protein has been termed one of the most effective dietary principles in safeguarding the integrity of hepatic function against a host of toxic agents. This ability of protein to counteract toxic influences has been demonstrated experimentally by the protection afforded the liver when certain amino acids are administered to the protein-depleted animal immediately prior to chloroform anesthesia.[1] Similar results are reported regarding the influence of arsenicals in protein-adequate and inadequate feedings.[2]

Certain amino acids, especially methionine and cystine, appear to be of prime importance for this protective influence. It may well be that the destructive action of many hepatotoxic agents is exerted through interference with some vital role of methionine in cell metabolism.[3]

Among man's protein foods meat ranks high, not only because of the percentage of protein contained, but principally because its protein is of excellent quality, presenting all the important amino acids, including methionine and cystine.

[1] Miller, L. L., and Whipple, G. H.: J. Exper. Med. 76:421, 1942.
[2] Messinger, W. T., and Hawkins, W. B.: Am. J. M. Sc. 199:216, 1940.
[3] Himsworth, H. P., and Glynn, L. E.: Lancet 1:457, 1944.

The Seal of Acceptance denotes that the nutritional statements made in this advertisement are acceptable to the Council on Foods and Nutrition of the American Medical Association.

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TRAILER extension, to give more floor space when camping, consists of a wide side door, hinged to the floor so that it may be opened out as a platform. Attached to it are an arched roof and end pieces which rest inside the trailer when the door is closed.

Science News Letter, October 20, 1945

TOY GUN, which sounds like a tommy-gun, resembles the ordinary plaything, but has arc-shaped scallops near the barrel end. An attached slidable hollow handle contains a reed with a free end that jumps from one scallop to the next, making the noise.

Science News Letter, October 20, 1945

HAND MAGNIFIER, with means of lighting objects under examination, is an elongated magnifying lens held in a frame with a widened base containing an electric bulb and reflector. An oblique handle, through which the electrical connection passes, is attached to the base of the frame.

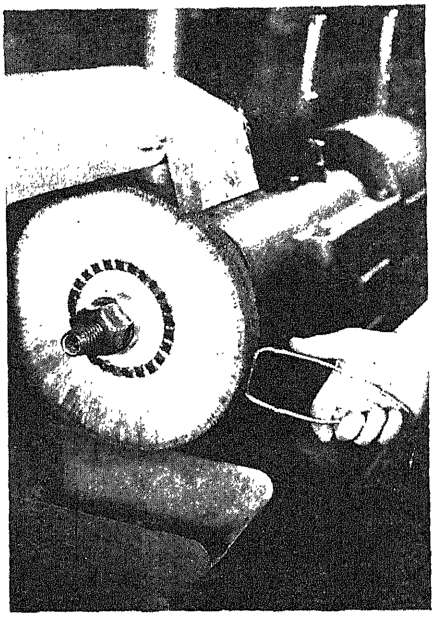
Science News Letter, October 20, 1945

NYLON LAYER, thinner than the finest stocking, sandwiched between the layers of synthetic rubber that form the flexible walls of warplane fuel tanks, prevents fuel from escaping through the walls. It keeps in both high-octane liquid fuel and gas fumes.

Science News Letter, October 20, 1945

PORTABLE step, to enable automobile repair men to reach the engine more easily, hangs with two hooked supporters from the front tire of the vehicle. The suspension hooks, which reach over the tire, are kept from sliding by the tread of the tire.

Science News Letter, October 20, 1945



HAND-MADE forceps, for holding tiny machine parts against a brushing wheel to remove surface irregularities, were developed by a workman in a war equipment plant. The picture shows the simple device which speeds up the job and makes it easier.

Science News Letter, October 20, 1945

WIRE STRIPPING device, to remove insulation from electric wires, has four blades that may be moved inward toward the center wire by pressing on the spring handle. When the insulation is cut through, this covering is removed by pulling the wire out of the device while continuing to squeeze the handle.

Science News Letter, October 20, 1945

DUCTS made of fire-resistant glass fiber combined with synthetic rubber and resins are used in an Army cargo plane to carry hot air, heated by the engine exhausts, to all parts of the wings and the tail assembly to combat ice formation. These non-metallic ducts are light.

Science News Letter, October 20, 1945

CONTINUOUS flow fuel system for aircraft, developed by the Army, automatically feeds gasoline to the engine as long as there is any left in the plane tanks. It is based on a simple arrangement of fuel lines and the use of a simple float operating valve; no operation by the pilot is required.

Science News Letter, October 20, 1945

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Question Box

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CHEMISTRY

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GENERAL SCIENCE

What new scholarships for discharged scientists are now offered? p. 243.

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What is the only way for the United States to control atomic power? p. 250.

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THE WEEKLY SUMMARY OF CURRENT SCIENCE • OCTOBER 27, 1945

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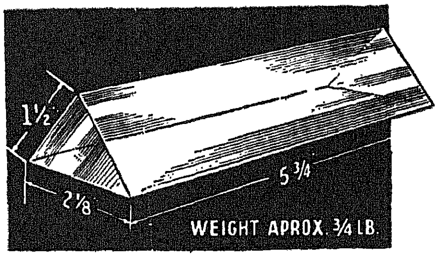
A SCIENCE SERVICE PUBLICATION

WAR BARGAINS in LENSES and PRISMS



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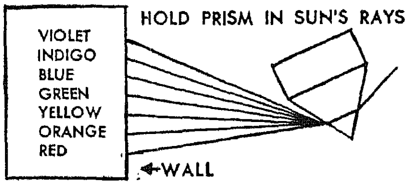

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3001-Q	Lens Surface	20 mms.	14 mms.	2.00
3006-Q	Porro-Abbe	9 mms.	9 mms.	.25
3009-Q	Porro	52 mms.	25 mms.	1.00
3010-Q	Porro	43 mms.	21 mms.	.50
3016-Q	Pentagon	45 mms.	22 mms.	.75
3029-Q	Dove	16 mms.	65 mms.	1.25
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6136-Q	Rhomboid	20 mms.	17 mms.	.50
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GENERAL SCIENCE

Research To Be Supported

Has been advocated at Senate hearings, but world implications of atomic energy proposals overshadow national science plans.

➤ THERE is going to be government support on a large scale for the sort of scientific research that will wrest new secrets, not just from the atoms, but many other sectors of the scientific unknown.

That much was clear with the Senate hearings on the National Research Foundation bills in their second week. And coupled with the broad research set-up are provisions for a plan for scholarships and fellowships for promising young scientists that will keep the scientific personnel of the nation up to fighting strength, ready to battle disease, poverty, and depression as well as military enemies.

The difference of opinion in the hearings arises with regard to how the proposed National Research Foundation is to be controlled and whether or not the act shall specify the degree of patent control the government shall exercise over the results of researches.

The organization for the proposed foundation provided in the bill of Senator Harley M. Kilgore (Dem., W. Va.), is a so-called "in-line" plan, consisting of a director, with an advisory committee with scientists in its membership and working divisions headed by scientists and committees of scientists. The director would have powers and responsibilities similar to those of a federal department head, and he would be appointed by the President and confirmed by the Senate and therefore be removable by the President. This form of organization has been supported in testimony of Secretary of Commerce Henry Wallace and Budget Director Harold D. Smith.

The other suggested organization for the Foundation would put control in a board of nine Presidential appointees who would serve without compensation and who would appoint a director to serve under them. This procedure was recommended by the "The Endless Frontier" report of Dr. Vannevar Bush, director of the Office of Scientific Research and Development, and is provided in the bill of Senator Warren G. Magnuson (Dem., Wash.).

The Kilgore form of organization is attacked on the ground that it puts the control of scientific research into the realm of so-called "political" control, while the Magnuson plan is criticized because the director is too far removed from democratic control and the governing board would tend to be static and unresponsive to changing conditions.

In both plans, just as in the wartime OSRD, scientists themselves would plan the details and carry out the researches. Under both plans the research itself would be done largely through contracts by university and other non-profit laboratories and industrial laboratories, not by the Foundation itself.

Who shall own the discoveries and any patents resulting is another controversial question. Under the OSRD, and current Army and Navy practice, the government retains only the right to use the results of the research in the work of the government itself. The commercial rights in patents go to the individual scientist and are usually assigned to the industrial or other laboratory conducting the investigation, even though the research is done largely or wholly with government money. This practice is virtually continued under the Magnuson bill through its failure to cover the matter of patents. The Kilgore bill provides that inventions and discoveries resulting from federally financed projects shall be the property of the United States, directs that they shall be patented, and authorizes nonexclusive licenses for all who wish them.

The Kilgore provisions are not favored by industrialists and scientists allied with industry, who would rather see the kind of contract made with the laboratories varied to suit the conditions of the particular piece of research to be done. They predict reluctance on the part of industrial laboratories to undertake investigations with government money if patent rights are lost. On the other hand, supporters of the Kilgore bill feel

BRITISH "FROGMEN"—In their skin-like diving suits, "frog" goloshes, and streamlined breathing helmets, these men of the submarine commando army swam underwater, towing on the surface explosive-packed pneumatic dinghies, placed their demolition charges so skillfully that 3,000 otherwise indestructible underwater steel obstacles blew up under German noses. They also cleared the enemy minefields laid off the invasion coast to make the safe landings on D-Day possible.

that if the public's money is spent the results of the investigation should be made available to all by the government.

Decisions upon these differences, important as they are for the future of American science, begin to seem somewhat unimportant when compared with the vastly larger decisions that will have been made should the May bill on atomic energy control in its present form be passed by Congress.

Under this bill potentially complete control of almost all chemistry and physics, and almost any other branch of science, is placed in the hands of a presidentially appointed commission of nine members, practically secure from removal during their nine-year terms, who in turn appoint an atomic energy administrator who wields unparalleled powers for peacetime. He can force the firing of anyone concerned with any phase of the work without being challenged in the courts. He can seize any property in the nation. He can declare any field of industry or science to come under his control.

Such an atomic energy act would be a declaration of an atomic bomb armament race, and, in fact, the mere consideration and tacit Presidential support of it, is a challenge to other nations with which the United States has been allied, particularly the U.S.S.R.

It is not alone a question as to how we here in America consider this proposal. We need to know how it is received in Moscow and we can guess that it can play a large part in stopping the building of world cooperation so urgently needed.

The atomic bomb is explosive enough, but the attitude toward atomic energy control may start a chain reaction of international rivalry that we will not be able to stop.

Science News Letter, October 27, 1945

"*Aquiculture*" is raising fish in farm ponds on fertilized water-plants.

PHYSICS

Atom Research Threatened

Secrecy proposals for all atom research threaten continued investigations. Scientists organize to express views before control is imposed.

➤ AMERICA is in danger of a stoppage of fundamental researches on the atom, the sort of scientific inquiries that gave birth to the atomic bomb.

Scientists by the thousands, those who have been working at the research Shangri-Las of Los Almos, New Mex., Clinton, Tenn., Hanford, Wash., and Chicago, Ill., are concerned about the secrecy provisions in the proposed atomic energy control bill and the chances of having a $300,000 fine or 30 years in jail held over them if they misjudge whether their researches should and should not be announced.

Rather than work under such restraint, many of them, as Dr. Harold C. Urey, Nobelist and heavy water discoverer, has suggested, will turn to safer fields of inquiry such as biological and physiological chemistry. Government control would apply to private, university and industrial investigation in nuclear physics and related chemistry because a license would have to be obtained by every investigator.

If this happens, the brilliant war researches that have produced the practical explosive release of atomic energy and the prospect of application of these researches to peacetime use, will be hampered.

Even now the research work at the government laboratories has slowed down tremendously. The scientists feel that they are not encouraged to push on in experiments that might be productive of new weapons and applications to non-military uses.

The return of a considerable number of the scientists to university and industrial laboratories was expected after the end of the war, but the present exodus to unrestrained research and teaching may deplete the staffs of the atomic laboratories to a dangerous degree.

The attempt in Congress to railroad the atomic control bill with only one day of hearings with pro-control government witnesses only heard has impressed the atomic scientists with the necessity of making their own expert opinions known.

Spontaneously in each of the major centers of atomic research, Oak Ridge, Los Almos and Chicago, groups composed of more than nine-tenths of the scientists there, have organized and formulated statements which point out the necessity for international control of the atomic bomb. The secrets of "know-how" in fabricating the bombs from plu-

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PHYSIOLOGY

Have Ultraviolet Vision

Persons whose front eye lenses have been removed in cataract operations see with ultraviolet radiations invisible to normal eyes.

➤ A "BUG'S-EYE" view of the world is obtained by persons who have had the front lenses of their eyes removed in operations for cataract. Their eyes become sensitive to ultraviolet radiations which have no effect on normal eyes but which many insects are believed to use regularly, Prof. George Wald of Harvard University told members of the Optical Society of America at their meeting in New York.

It was formerly assumed that insects, with their ultraviolet vision, would see a quite different world from the one visible to human beings. However, since there are thousands of men and women who have ultraviolet vision as an after-effect of cataract operations, it has become evident that things do not look particularly different when ultraviolet is added to the ordinary range of visible radiations.

As a special case, Prof. Wald mentioned a brilliant young English physicist, Dr. A. G. Gaydon, who lost his right eye and the lens of his left in an explosion. Courageously carrying on with his researches, which were on light and related radiations, he found that his misfortune was in part good fortune, for he could now see the ultraviolet portions of the spectrum previously invisible.

The eye's front lens, Prof. Wald explained, cuts out ultraviolet and much of the higher blue-violet radiations because its yellowish tinge causes it to act as a ray-filter. This yellow color in the lens, and also the highly sensitive yellow spot in the retina directly opposite the lens, are due to the presence of xanthophyll, a yellow pigment related to carotin, both of which are abundant in such yellow vegetables as carrots and rutabagas, in green leaves, and in the yolks of eggs. Xanthophyll has actually been extracted from the retina.

Studies in Prof. Wald's laboratory have shown wide ranges in sensitivity of the retina to different wavelengths of light. The reginal cones have their maximum sensitivity in the yellow-green part of the spectrum. At the borderline of the ultraviolet the cones still function, but with a sensitivity only about one forty-thousandth of the maximum. Similarly they still function at the lowest red wavelength, at the margin of the infrared, but their sensitivity there is only one ten-thousandth of the maximum.

The retinal rods, which operate chiefly in dim light and "see all things gray", are most sensitive to blue-green light.

Science News Letter, October 27, 1945

MEDICINE

Promin for Leprosy

Has brought improvement in 137 cases. Sores, other symptoms clear up and the germs disappear. Takes at least six months before improvement shows.

➤ PROMIN, chemical remedy distantly related to the sulfa drugs, comes closer to being a cure for the age-old scourage of leprosy than anything so far known, it appears from results with it at the National Leprosarium in Carville, La.

"The best experimental treatment ever tested at the National Leprosarium" is the verdict given by Dr. G. H. Faget and Dr. R. C. Pogge, U. S. Public Health Service. (*Public Health Reports,* Oct. 5)

The chemical has now been given to 137 patients. In these it has checked the progress of the disease and even caused the dreadful sores of leprosy to clear up in some patients. Other symptoms also abated. In more than 10% of 62 patients treated for more than one year no germs could be found in the sores. In another 30%, the patients have had occasional negative bacteriology tests since the treatment was started. Only two patients, each with an advanced mixed type of leprosy with laryngeal involvement, got worse under the treatment and it had to be stopped after a few months.

The results, Dr. Faget and Dr. Pogge believe, are due to a true remedial action of the chemical on the disease and not to psychological response of the patient nor to the chemical's effect on secondary infections or other complications. The improvement is not believed to be a spontaneous remission because it occurred in patients having types of the disease with the worst outlook and least likely to improve spontaneously for a time.

Promin cannot, however, be called a "specific" for leprosy, since it cannot be proved that it acts directly on the germs of the disease. These germs cannot be grown in the laboratory, so no tests of promin's action on them can be made directly. Neither can guinea pig tests be made of promin's effect in leprosy, because the human disease cannot be reproduced in laboratory animals.

The chemical acts slowly. It takes at least six months of treatment before improvement shows. The longer the patient is treated and the more promin he gets, the greater his improvement, the physicians found in more than three years experience with the drug.

Science News Letter, October 27, 1945

PHYSICS

Mica Indispensable For Many Applications

➤ MICA, now well-known as a war essential because of its electrical properties that make it invaluable in controlling wavelength in radio, has other physical properties that make it almost indispensable in many other applications. Some of the micas have tremendous expansion when heated, an outstanding peculiar property that make them of special use in temperature-control devices.

The micas all vary widely in thermal expansion, power factor, and color, the National Bureau of Standards states. (*Journal of Research.*) Their properties depend upon chemical composition, the nature of the crystals, their magnitude and orientation, amount of impurities, and other features.

The report on the physical properties of mica in the journal is made by Peter Hidnert and George Dickson of the bureau staff and records findings made by them in laboratory studies. They present data on the linear thermal expansion, changes in structure, power factors in radio frequency control, and the effects of heat treatment on thickness, opacity and color of micas from many different sources, both domestic and foreign.

Science News Letter, October 27, 1945

CHEMISTRY

Improved Plastic

Made from cellulose and natural gas, the new product is lighter, more lustrous, tougher and odorless. Has best balance of desirable characteristics.

➤ MORE LUSTROUS, faster to mold, odorless and tough, a new plastic made from natural gas and wood has been introduced to commerce by Celanese Plastics Corporation.

Named Forticel, it is made from cellulose and propionic acid. It was merely a laboratory product until Celanese chemists developed a new process for producing propionic acid for the first time in this country from natural gases in commercial quantities at reasonable prices.

The process is in operation now at the company's new chemical plant at Bishop, Texas. While present production is limited to a small pilot plant, a steady moderate production of Forticel by next January is to be followed by large-scale production as soon as plans already approved for this purpose can be carried out.

Forticel is the culmination of years of intensive research devoted to the study of scores of chemical combinations developed by introducing organic acid or alcohol radicals into the cellulose molecular chain.

Of all the cellulosic compounds produced, Forticel has, in the opinion of Celanese chemists, the best balance of desirable characteristics.

As a thermoplastic the most economical and satisfactory process for making Forticel into finished articles is by injection and extrusion molding. Finished products are characterized by an unusual surface luster and brilliant mold finish, obtained without any mechanical polishing. The molding cycle has been reduced as much as twelve seconds where Forticel replaced cellulose acetate in tests in the same die. In certain instances this gain in molding time was equivalent to a 25% increase in production. The superior plastic flow quality of Forticel in the molding operation insures virtually invisible weld lines where two streams of plastics meet in the die. These lines are often the seat of mechanical as well as visual flaws. Other scientific tests showed that Forticel has a greater strength in the weld than any of the present commercial cellulose esters.

Forticel is odorless, so that even the most delicately perfumed lipstick or face powder is not affected. Articles made of it can be painted and lacquered without fear of tackiness. The new plastic has a low specific gravity of about 1.2 or less, thus weighing only slightly more than water. Where 100 molded pieces are obtained from a pound of cellulose acetate 108 pieces can be obtained from Forticel. With a toughness of high impact strength not equalled by any other thermoplastic the consumer can expect longer life and better service from articles molded of Forticel even under the roughest treatment. Colorability of the new plastic includes the full range of the color spectrum and it can be produced in colored mottles and intricate color designs. Also Forticel has the same excellent electrical properties as lumarith (cellulose acetate) and exceeds them in that it has the same high dielectric strength but a lower power factor and a lower dielectric constant. Because of low moisture absorption its electrical properties are little affected by changes in atmospheric conditions.

Special grades of Forticel will be manufactured into sheets and continuous films where good dimensional stability and toughness will tend to further extend the use of the cellulosic plastics.

Numerous uses are predicted for it, including radio housings, steering wheels, house and kitchen utensils, telephones, vacuum cleaner parts, toothbrushes, tool handles, topographic map bases, formed containers, printed dials, electrical insulation, mathematical instruments and glazing materials.

Science News Letter, October 27, 1945

PUBLIC HEALTH

Rest Is Fundamental Treatment for TB

➤ REST treatment, usually in a sanatorium, "will probably remain as the fundamental remedy for tuberculosis," Drs. H. Corwin Hinshaw and William H. Feldman, of the Mayo Clinic, declare in the *Bulletin of the National Tuberculosis Association*. These scientists have been steadily searching for years for a chemical remedy for tuberculosis and recently reported some promising results with streptomycin, newest of the penicillin type of remedies.

Streptomycin, however, has not yet given the kind of results in tuberculosis that sulfa drugs or penicillin give in some other infectious diseases, such as pneumonia. The Mayo scientists explain this as follows:

"In pneumonia the infection has been present for a few days at most, the inflamed tissues of the lungs are intact and when the drug restrains further multiplication of the pneumococci, the human body promptly recovers in a manner resembling the natural crisis of pneumonia.

"In other diseases, also, successful treatment with drugs merely permits recovery by natural processes, and the promptness of such recovery depends on the nature of the disease process and the defensive powers of the patient.

"Tuberculosis, however, often is a chronic disease which produces destructive changes in tissues. Healing or repair of these tissues is exceedingly slow. Furthermore, in extensive tuberculosis of the lungs which has been progressive for long periods the destructive changes impose serious mechanical handicaps to the healing process. When such mechanical handicaps are present, it is logical to utilize a corrective mechanical type of treatment, such as the conventional surgical collapse procedures rather than treatment with a drug.

"The patient who is faced with the necessity of surgical treatment, therefore, should not hope for any alternative chemical remedy and we would urge him to proceed with the contemplated operation without unnecessary delay."

Science News Letter, October 27, 1945

ORNITHOLOGY

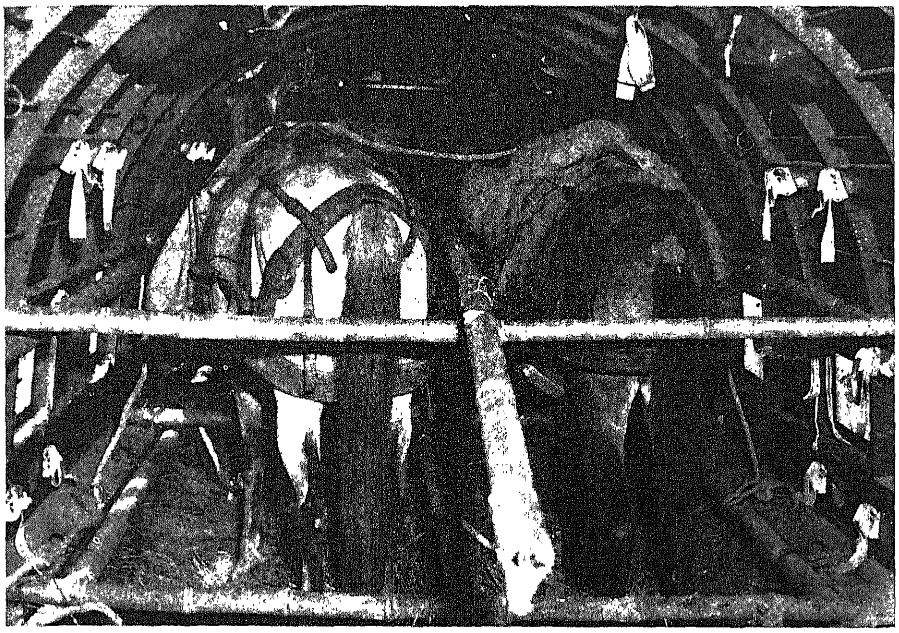
Army Homing Pigeons Offered for Sale

➤ WANT SOME first-class carrier pigeons?

You can get these feathered GI messengers from the Office of Surplus Property, U. S. Department of Commerce, by sending a certified check or money order for $25. Five pairs of pigeons, aged from one to four years, will be forthcoming. These sales are to be made direct to civilians, without intermediaries.

OSP officials expressed the hope that 4-H clubs, bird fanciers and breeders will take advantage of the sale. It is not possible to furnish pedigrees, but all birds are known to be of good breeding stock, and some have championship potentialities.

Science News Letter, October 27, 1945



PLANE RIDE—The plane is loaded with four animals. Two attendants are stationed between the first and second sets of stalls. The animals did not mind the altitude, which was 14,000 feet.

AERONAUTICS

"Flying Horsecars"

Hundreds of pack mules and horses were carried over the hump in Burma-to-China transport. Animals merely got sleepy at time of oxygen lack.

➤ THE COW jumped over the moon only in the imagination of the nursery-jingle writer, but mules actually flew over mountains during the recent war. One of the strangest jobs of animal transport ever undertaken, involving carriage by air of 2,682 U. S. Army pack mules and horses, is described in the *Cavalry Journal,* (Sept.-Oct.) by a veterinary officer, Col. Ralph W. Mohri.

The animals had originally been taken into the Burma campaign theater, where jungly, swampy, mountainous terrain had licked all motorized transport, even that mechanical mule, the jeep. Troops served by this old-fashioned but effective hoofed supply train had the Japs well on the road to liquidation, and it was decided to transfer part of them over the Himalayan "hump" into China, where the enemy was still strong.

Air transport of the troops, weapons and supplies was no special problem; that had been going on for a long time. But taking along the indispensable pack animals was something else. Mules and horses had been air-borne in numbers once before in the theater, by the British, but that had not involved so long a hop, nor had it required flight up to 20,000 feet altitude.

Biggest worry was about the possible behavior of the animals at altitudes where men have to put on oxygen masks. Would they take the oxygen lack quietly, or would they become panicky and begin to kick and rear, threatening the safety of all aboard? The event proved the anxiety needless: the animals merely became sleepy. In general, Col. Mohri reports, both horses and mules took their airplane trips very quietly, and without particular excitement.

Planes used were the ATC's old reliable C-47's. They were converted into flying horsecars by taking out the bucket seats and securely wiring in stall partitions of green bamboo. Floors were specially prepared by laying down first a layer of stout plywood, then a waterproof tarpaulin, then heavy coconut matting, and finally hay. From four to six animals could be carried, together with their attendants, and five days' rations for both men and animals. It took about 20 minutes to load a plane, and time in the air was about two and one-half hours.

Science News Letter, October 27, 1945

METEOROLOGY

Radar May Increase Knowledge of Meteorology

➤ RADAR instruments developed for war purposes may play an important part in future weather forecasting and also make permanent records relative to the nature of storms and their movements for use in the science of meteorology. The entire progress of the recent September hurricane in its gradual curve up Florida was accurately plotted on film by Army radar war equipment. Photographs of each radar scope were taken each 15 seconds by electrically operated cameras.

The use of radar to detect storms began at least as early as August, 1943. Before that, Army radar technicians had noticed "ghost echoes" on their relatively primitive scopes but did not realize at first that they were caused by thunderstorms. Later they did, and Army weather observers soon learned how to use radar to plot other storms and they later developed better techniques of detection. But the size and violence of the September 15 storm, and its closeness to the radar station, resulted in new findings about the nature of hurricanes.

Throughout the hurricane the general shape of the disturbance was plainly seen on the micro-wave set, whose energy was reflected excellently from the rain carried by the storm. The storm was seen to be in the shape of a figure six with clockwise spiralling tails. At one time six distinct tails were observed, three of which were detached and were moving northward ahead of the storm's center. These tails were deduced to be rain-bearing storm clouds, or line squalls eight to ten miles in width and from three to five miles apart.

When the hurricane was abreast of the radar station, and only 10 miles away, the radar revealed that the eye of the storm, the low pressure area in its center, was 12 miles in diameter, and the lack of echoes proved that there was no precipitation within it. The height-finding radar set revealed that the dense cloud deck surrounding the eye extended up to an average height of 18,000 feet.

Science News Letter, October 27, 1945

HORTICULTURE

Removing Tops of Carrots Keeps Moisture in Roots

➤ REMOVAL of part or all of the foliage of carrots in shipping and marketing has been advocated from time to time as a means of conserving shipping space and containers.

A series of storage experiments at Cornell University shows that the principal effects of removing carrot tops at the time of harvest is to preserve moisture in the roots.

When stored for seven days at 70 degrees Fahrenheit, and a relative humidity of 65%, topped carrots lost about 40% less moisture than did roots of carrots with tops attached. At a storage temperature of 40 degrees and relative humidity of 70%, the topping of carrots resulted in a 55% reduction in shrinkage losses during a 17-day period.

When the tops were cut back to a length of four inches, the roots lost only little more moisture than did those from which the tops were removed entirely.

At the end of each storage period, the topped carrots had a decidedly better appearance than did the roots with leaves attached, reports Prof. Hans Platenius of the vegetable crops department.

Changes in carbohydrates were practically the same, regardless of whether the carrots had been topped. No significant effect could be observed in the carotene content of the roots as a result of removing the tops.

Science News Letter, October 27, 1945

RADIO

Broadcasting Celebrates 25th Anniversary

➤ RADIO broadcasting is now 25 years old as an American system and its silver anniversary will be celebrated by a National Radio Week, beginning Nov. 4. The week is sponsored by the National Association of Broadcasters in cooperation with the four major networks and the Radio Manufacturers Association.

The first regularly scheduled broadcast, it is claimed by Westinghouse Electric Corporation, was a report of returns of the Harding-Cox presidential election, Nov. 2, 1920, presented on its Pittsburgh station.

The year 1920 does not mark the discovery of radio or of radio broadcasting, but it is the date of the origin of the American broadcasting system. Experimental licenses were granted as early as 1916, but they were for stations experimental in character. In 1920, radio broadcasting ceased to be an experiment and became a permanent adjunct to American life.

The first radio broadcast in history, it is claimed, was on Christmas eve, 1906, from the Fessenden station at Brant Rock, Mass. Morse code radio operators on vessels at sea were among those who picked up the human voice from the air, very much to their surprise, instead of the familiar dots and dashes.

Prof. Reginald A. Fessenden was one of the pioneer radio experimenters. This first broadcast was made possible by the development of the high frequency alternator by Dr. Ernst F. W. Alexanderson, consulting engineer of the General Electric Company, who earlier this year was the recipient of the highly prized Edison medal for 1944, awarded to him for this and other outstanding radio and electronic discoveries.

During radio week, broadcasters, equipment manufacturers and others identified with the American system of broadcasting will tell the public the meaning of this kind of broadcasting, how it came into being, its position in local and national affairs in war and peace, its role as a guardian of free speech, and its contributions to the welfare of the nation and to individual citizens.

Science News Letter, October 27, 1945

AGRICULTURE

Cotton-Picking Machine Operates on New Principle

➤ A MECHANICAL cotton picker operating on a new principle is the subject of patent 2,387,004, obtained by Charles R. Berry of Vicksburg, Miss. It is designed to take advantage of the recently developed method of defoliating the cotton plants with a chemical spray before picking the bolls, which greatly simplifies the mechanics of picking.

The machine runs astride of a cotton row, passing the plants through a kind of tunnel with slots in its sides. From one side, a series of flexible arms mounted on a revolving vertical cylinder keep pressing the plants against the other side. Through the slots on that side reach innumerable slender pins mounted on what the inventor cal's a carding cylinder, and these pick off the cotton bolls. Next to the carding cylinder, within the machine, is a second cylinder, the doffer, which has rows of bristles that knock the bolls off the carding pins and into a conveyor chute that carries them to an accompanying truck or trailer.

Science News Letter, October 27, 1945

IN SCIEN

MEDICINE

Flu Virus Can Also Act Like a Poison

➤ SOME STRAINS of influenza virus can act like a poison, damaging the liver and other organs, as well as causing the disease, influenza, it appears from studies reported by Drs. Werner and Gertrude Henle of the University of Pennsylvania. (*Science*, Oct. 19)

Their findings in studies with mice may explain why some influenza epidemics are worse than others.

The poisonous or toxic effect of influenza virus was discovered when it was injected into the peritoneum of mice. The peritoneum is the membrane which lines the abdomen. The mice died, usually within 72 hours after these injections, although they apparently did not have influenza. In some cases lungs as well as other organs showed the damaging effect of the virus, but in other cases, when a less toxic strain of virus was injected, the lungs were not involved at all. Although the virus may have this poisonous effect on various organs, it can propagate only in the respiratory tract of the mouse.

The poisonous action of the virus shown in their experiments may, the scientists feel, play a part in the development of influenza in man. Different strains of virus varied marked'y in their poisonous action in mice which suggests a reason for the difference in severity of influenza epidemics.

Science News Letter, October 27, 1945

PHYSICS

Continued Atom Research By Bohr Assured

➤ THE CONTINUANCE of the scientific researches of Dr. Niels Bohr, leading Danish scientist and Nobelist who worked in America on the atomic bomb, has been assured by the establishment of an endowment fund of $175,000 contributed by 35 Danish firms and funds.

The fund was established in honor of Dr. Bohr's 60th birthday and one of the greetings he received came from Dr. Albert Einstein in Princeton, N. J., who observed that the atom is undoubtedly much more grateful to Bohr for his theory of its structure than for its splitting.

Science News Letter, October 27, 1945

PHYSIOLOGY

Aviators' Visual Blackout Due to Anemia in Eyeballs

➤ BLACKOUT of eyesight in aviators during sharp turns or dive pull-outs at high speeds is due to a temporary anemia in the eyeballs themselves. It can be prevented by suction applied to the eyeballs by special goggles.

These findings, locating the site of origin of this disturbance in the eye, were reported by Dr. E. H. Lambert and Dr. Charles Sheard of the Mayo Clinic at the meeting of the Optical Society of America in New York.

Application of suction to the eyeball, however, is not of practical importance to the aviator to prevent loss of vision during high speed maneuvers because it does not prevent the unconsciousness which occurs at higher levels of centrifugal force than those required to produce visual blackout.

In the experiments reported, a man seated comfortably in a chair on the ground suffered temporary loss of vision, or blackout, when air pressure was applied to his eyeballs through specially constructed goggles. The visual changes were of the same nature as the blackout produced by centrifugal force in high-speed aircraft. Both resulted from a similar impairment of blood supply to the eyeball. The application of mild pressure to the eyeball of a man on the human centrifugal caused him to blackout at lower levels of centrifugal force than usual.

Science News Letter, October 27, 1945

ENGINEERING

Metal-Plated Plastics Coming Into Wider Use

➤ PLASTICS plated with metals, now coming into wide use, particularly in the electrical field, have opened up a large new field in electrical engineering and electronics and inspired laboratory research to develop better electroplating methods of applying the thin metal coatings. A report on such investigations was given at the meeting of the New York section of the national Electrochemical Society by Harold Narcus of the Plating Processes Corporation, Holyoke, Mass.

Metallizing a plastic, he stated, is done either to save critical metals, or to produce a product which has the inherent properties of the plastic in addition to the desired properties of the deposited metal. The most important advantage of plating on plastics, he explained, "is the greater corrosion resistance of a metallic deposit when it is applied to a plastic basis than to the usual metallic basis, since there are no galvanic couples with a basis metal."

Important use of plastics plated with metal is in electrical insulation where screening against magnetic fields is required, high frequency currents, or radium emanation, he stated. Articles made of plastics for these purposes, such as phenols and styrenes, which are excellent electric insulators, are plated with copper, cadmium, or lead.

"This combination of a non-conductor and a conductor promises wide use in radio, television, and in electronics in general," Mr. Narcus continued. "Metals such as aluminum and magnesium are being replaced by plated plastics in aircraft electric shielding and in radio shielding devices." Metallization of plastics is also employed in frequency modulation and television antennae.

"Generally, the most economical, commercially successful method for metallizing plastic," he concluded, "consists in the application to the surface, after proper preparatory treatment, of a highly conductive and strongly adherent bond coat of metallic silver, by reducing an ammoniacal silver nitrate solution with a suitable reducing agent, followed by an intermediate layer of copper and finally a top layer of the desired metal."

Science News Letter, October 27, 1945

INVENTION

Thawing Beef Carcasses From Inside Outward

➤ FROZEN beef carcasses may be thawed from the inside outward, as well as from the surface inward, by a technique on which patent 2,387,221 was awarded to B. E. Williams and L. L. Cadwell of Chicago. The process is very simple: the carcass is left whole, and a flexible rod containing electric heating elements is inserted into the cavity of the spinal column. The same method may also be used for a uniform tenderizing of the beef through mild heat application. Rights in the patent are assigned to the Industrial Patents Corporation.

Science News Letter, October 27, 1945

ASTRONOMY

Discoverer of Planet Goes to UCLA

➤ THE DISCOVERER of the planet Pluto, Clyde W. Tombaugh, is to be visiting assistant professor of astronomy at the University of California at Los Angeles. During the term beginning Oct. 26 he will give classes in celestial navigation, an essential part of air navigators' training, as well as in elementary and stellar astronomy.

Mr. Tombaugh was a young assistant at the Lowell observatory at Flagstaff, Ariz., when he discovered the ninth major planet in the solar system. Subsequently he was first holder of the Slosson scholarship at the University of Kansas, founded in memory of Dr. Edwin E. Slosson, first director of Science Service. Mr. Tombaugh received his bachelor's degree there in 1936, and his master's degree in 1939. In recognition of his discovery of Pluto, he was awarded the Jackson-Gwilt medal of the Royal Astronomical Society in 1931.

Science News Letter, October 27, 1945

ENGINEERING

Gas Turbine Laboratory To Be Established

➤ THE IMPORTANT role that gas turbine engines are expected to play in the power field in the future is indicated by plans recently announced to establish a gas turbine laboratory at the Massachusetts Institute of Technology. It will be used for graduate instruction and fundamental research in this new and promising field in engineering.

The gas turbine was applied during the war with spectacular success in jet-propelled aircraft and is considered one of the most important technical developments to emerge from the war. As a power plant it holds great promise for many other transportation and industrial uses. However, it is as yet far from perfect and there is a need for technical research and the discovery of new techniques required in the construction of these engines which operate at extremely high speed, high temperature, and high compression.

The new laboratory will contain a supersonic wind tunnel and unique facilities for research on the elements of compressors, combustion devices, jets, and gas turbines. It will also have testing facilities for the operation under controlled conditions of such devices.

Science News Letter, October 27, 1945

ASTRONOMY

Mars Begins Its Approach

Four first magnitude stars, Vega, Deneb, Fomalhaut and Capella are also visible on November evenings. The famous meteor shower occurs on the 15th.

By JAMES STOKLEY

➤ STILL approaching closer to earth, and at the same time increasing in brightness, the planet Mars comes into easy view during the month of November. It does not show on the accompanying maps, as they depict the appearance of the heavens at 10 p.m., standard time, on Nov. 1 and 8 p.m. at the end of the month. On Nov. 1 Mars does not rise until about 10:30, when it appears in the northeast in the constellation of Cancer, the crab, just under that of Gemini, the twins, which does appear on the maps in the northeast. In this figure another planet, Saturn, is shown, but it is about three-fourths the brightness of Mars.

Looking among the stars—those distant suns which unlike the planets shine with their own light—we see a familiar group reappearing in the east. This is Orion, the warrior, which is so conspicuous on winter evenings. Three stars in a vertical row form the belt of the warrior, who is now on his back. North of the belt is the bright star Betelgeuse, south of it is Rigel. Directly above Orion is Taurus, the bull, in which the bright red star Aldebaran is conspicuous.

High in the south is the familiar "great square," three stars of which are in Pegasus, the winged horse, and a fourth, Alpheratz, in the upper left corner, in Andromeda, the chained princess. None of these stars are of the first magnitude, but they are all easily located.

First Magnitude Stars

Three stars that actually are classed as first magnitude can be seen in the west, led by Vega, in Lyra, the lyre. Above this and a little to the left is the northern cross, in a vertical position, which is really part of Cygnus, the swan. The bright star Deneb is at the top of the cross. Farther to the left, about as high as Vega, is the third of these first magnitude stars, Altair, in Aquila, the eagle.

Low in the south is still another first magnitude star, Fomalhaut, which is so near the horizon that it does not appear as bright as some that are higher though fainter. The light from a star that is low in the heavens has to pass through a greater thickness of the earth's atmosphere than one that is nearer the zenith.

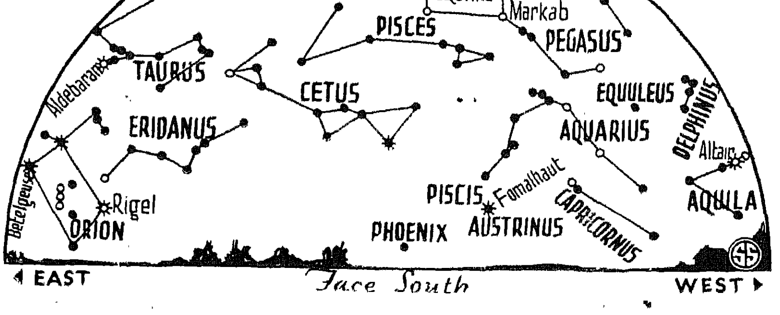
Last of the stars of first magnitude is Capella, in Auriga, the charioteer, in the east above Gemini. About half way between Auriga and Lyra is the pole star, Polaris, part of Ursa Minor, the lesser bear. Ursa Major, the great bear, of which the great dipper is part, is low in the north, in its poorest position of the year. High in the north, however, in its best position, is Cassiopeia, the queen, with the principal stars arranged to form a letter M.

As for the other planets, not already mentioned, Mercury is very briefly in the evening sky about Nov. 17, but it is so low, and sets before the sky is very dark, that it will be hard to locate. Venus is in the constellation of Virgo, the virgin, and rises in the east about two hours before the sun. Jupiter is also in Virgo, farther west, and rises about three hours before sunrise.

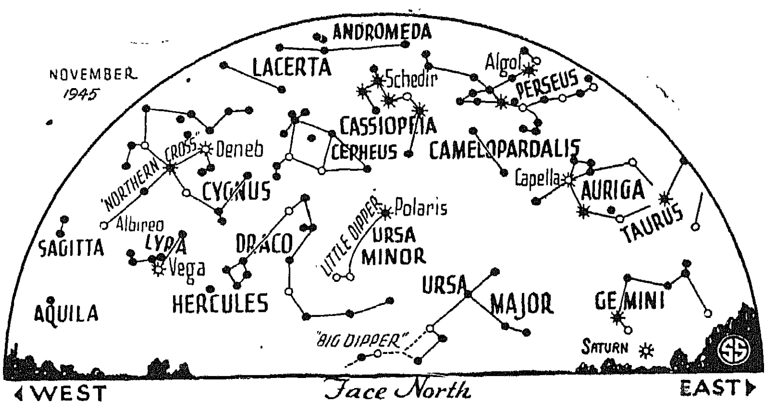
When, in the next few months, Mars reaches a brightness of magnitude minus 1.2, brighter than any night-time star except Sirius, the most brilliant of all, it will be hard to realize that during the early part of 1945 this same planet was down nearly to the second magnitude, but that is the case. The reason for this great change in brightness, of nearly four and a half times, is found in its changing distance. The earth's average distance from the sun is about 93,000,000 miles, and that of Mars, next planet out, is 141,500,000 miles. When the earth and Mars are in opposition, or both in the same direction from the sun, they are near together, while at times when Mars is in the same direction as the sun is from us, as it was at the end of 1944, it is very far away.

On Jan. 1, 1945, Mars was just moving to the west of the sun, and then was about 2½ times as far as the sun, making its distance about 225,000,000 miles. But this year it has been drawing in, and getting more brilliant, so that on Nov. 1 it is at exactly the sun's distance. By the end of November it will have moved in to about 74,000,000 miles. Next January, when it is closest, it will be only 59,200,000 miles distant, and then it will start withdrawing again. During the rest of the autumn and early winter, it will be coming into a better and better position in the evening, and as it brightens it will be interesting to watch.

Its approach in January, however, will not be a particularly close one, as Mars may approach within about 34,000,000 miles of the earth. The reason for the great difference in the distance to which Mars can approach is found in the eccentricity (or departure from a true circle) of the orbit of Mars. At the places where the two orbits are closest, they are only 34,000,000 miles apart, so



☼ ✱ ○ ● SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS



when the opposition occurs at this position, that is the separation of the planets. The opposition next January will occur when they are in parts of their orbits that are very far apart.

On the evening of Nov. 23, when the moon rises, people in the western part of the country will see Mars just above it. But in the east, people watching the moon rise, will not see Mars at all. For there, at that time, Mars will be hidden, or occulted, behind the moon. In Europe it will be possible to see Mars before its immersion, or covering, by the moon, but even in the eastern part of the United States this occurs before moonrise. At Washington the planet will reappear from the moon's limb at 9:29 p.m., E.S.T. Throughout the east the reappearance will be at a time not very different from this. In western Massachusetts, for example, the reappearance, or emersion, will occur at 9:32 p.m. Farther west, of course, the planet will be uncovered before the moon rises at all, so people there will only be able to see the moon and planet unusually close together.

Meteor Showers

November brings one of the most famous of meteor showers, the one in which the "shooting stars" seem to radiate from the constellation of Leo. This shower is therefore called that of the Leonids. About the night of Nov. 15, the earth will pass through this swarm of cosmic dust, which moves in a vast orbit around the sun, and on that night there will be more meteors visible than ordinarily. However, conditions will not be especially favorable, because the moon will be nearly full and shining brightly most of the night. Consequently its glare will hide many of the Leonids. With any meteor shower, more can be seen after midnight than before, because then we are on the forward side of the earth and meet them coming, while during the evening those that appear must catch up to us. So if you are watching for meteors on the night of the 15th, you will have to stay up late to see them at their most numerous.

Celestial Time Table for November

NOV.	EST	
2	7:19 a. m.	Moon passes Jupiter
	2:51 p. m.	Moon passes Venus
3	10:44 p. m.	Algol (variable star in Perseus) at minimum
4	11:00 a. m.	Moon farthest, distance 252,700 miles
	6:11 p. m.	New moon
6	7:32 p. m.	Algol at minimum
12	6:34 p. m.	Moon in first quarter
15	Early a. m.	Leonid meteors
17	3:00 p. m.	Mercury farthest east of sun
18	9:00 p. m.	Moon nearest, distance 221,900 miles
19	10:13 a. m.	Full moon
21	3:37 a. m.	Algol at minimum
23	8:06 a. m.	Moon passes Saturn
	10:20 p. m.	Moon passes Mars
24	12:26 a. m.	Algol at minimum
26	8:28 a. m.	Moon in last quarter
	9:15 p. m.	Algol at minimum
29	6:04 p. m.	Algol at minimum
30	12:25 a. m.	Moon passes Jupiter

Subtract one hour for CST, two hours for MST, and three for PST.

Science News Letter, October 27, 1945

ORDNANCE

Japs Got Greater Tonnage Of Incendiary Bombs

➤ THE JAPS were on the receiving end of a greater weight of air-borne American incendiary bombs than the Germans, although the actual number of such bombs dropped on the Japs was less than the number unleashed in the sky over Germany. This is because a new type of bomb, known to soldiers as the "goop," came into action relatively late in the war. This bomb is much heavier than those used previously, and also much more destructive.

The "goop" is a pyrogel bomb, containing napalm, or thickened oil, as an ingredient. Over 88,000 tons of various napalm type bombs were dropped in the Pacific area, while about 42,000 tons were used in the European area. These are figures just released by the Chemical Warfare Service.

Approximately 50,000,000 Chemical Warfare Service incendiary bombs were dropped from the air in the late war. Of this number, more than 28,000,000 fell on Axis targets in the European and Mediterranean theaters, and more than 19,000,000 on Japanese installations. The fire tonnage in the Pacific area was 122,000, against 120,000 tons in Europe.

The most used individual bomb in number and tonnage was the M50 four-pound magnesium firestick, dropped in clusters. More than 37,000,000, or 92,000 tons, of these were unleashed on all theaters.

Science News Letter, October 27, 1945

GENERAL SCIENCE

Competition Announced for Five $1500 Scholarships

➤ FIVE $1500 science scholarships at the University of Rochester, open to students in nearly 3,000 high schools and preparatory schools, are announced by the University and by the Bausch and Lomb Optical Company, sponsors of the scholarships. This is the third year of the competition.

The scholarships will be awarded next spring, after a competition among students who have become eligible through the winning of honorary award medals offered by Bausch and Lomb. Winners are brought here for final tests and interviews, and are entertained for two days with all expenses paid.

Science News Letter, October 27, 1945

Of the 7,306,000 *troops* shipped overseas in the past four years, 4,687,850 departed from East Coast ports, 2,451,000 from the West Coast, and 167,000 from Gulf Coast ports.

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Do You Know?

Piano strings are almost eight times as strong as ordinary steel.

Some *forest fires* travel faster than a deer can run.

X-rays have now been used in hospitals for just 50 years.

Lily bulbs, formerly Bermudan, are being grown in Florida with apparent success.

Mica, an essential in electrical instruments, is no longer under government restrictions.

A *whistle* that emits sound waves of too high a frequency to be detected by human ears, but which do irritate pigeons, is to be used experimentally to drive out perching pigeons on a Western public building.

Essential *oils,* though having a widely different chemical composition, have three common properties; volatility; combustibility, and the ability to form only a temporary grease spot on paper.

A solution of certain *resins in alcohol,* for application to the hands of surgeons and nurses making the use of rubber gloves unnecessary, is reported to have been developed in Germany.

Government chemists are obtaining 90 gallons of *liquid fuel* from one ton of such farm wastes as corncobs and cottonseed hulls; the fuel is 50% ethyl alcohol, the rest being butanol, acetone and other flammables.

Five breeds of *dogs* were found best for Army purposes, and only these, or positive crosses of these breeds, were accepted for military uses; they are the German Shepherd, Belgian Sheep, Doberman Pinscher, Collie and Schnauzer.

Ambergris is a curious substance that seems to be produced only in the intestines of sick whales; formerly used in perfume making, it has now been replaced by synthetic chemicals.

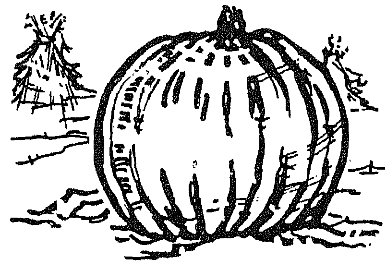
The *helicopter* is proposed for the farm spraying program because it is a type of aircraft that can hover just over an orchard tree until the spraying of the tree has been thoroughly completed.

ETHNOLOGY

NATURE RAMBLINGS

by Frank Thone

Syncretic Holiday



See Front Cover

➤ HALLOWE'EN, as the shape of the word indicates, is a contraction: in extended form it is the Eve of All Hallows, or in more modern ecclesiastical language, the Vigil of the Feast of All Saints. As such, it is supposed to be a day of soberness and fasting, in preparation for the solemnities of the morrow.

What connection has such a strictly religious observance with pumpkins and cornshocks such as those pictured on the cover of this SCIENCE NEWS LETTER, with black silhouettes of witches and cats, with kids wearing false-faces and fancy costumes and playing pranks in the streets after their usual bedtime?

The story is a long and curious one, involving pagan antiquity, the policy of the ancient Church, and a transplantation of European culture into a new land. It begins with the harvest-home feast observed in practically all agricultural lands, where the people rejoice and give thanks for a good crop, and take a little time off from hard work. In ancient Latium, it took the form of the Saturnalia, when the banished father of the Olympian gods was permitted to return for a little while, and everybody had a good time and nobody worked.

Came Christianity, and Jupiter and all his court had to join Saturn in exile. The feast remained, for the policy of the Church was not to uproot violently but to convert and change meanings; the places of the many lesser gods were taken by the host of saints. The gods, going underground, became imps and hobgoblins, and had their day (or rather, their night) just once a year. As slaves had enjoyed a brief spell of license under the Roman rule, serfs and lower servants and children took leave to frolic under the newer dispensation. Gradually the Saturnalia dwindled, until none but children were left to impersonate the departed and all-but-forgotten pagan deities.

When Europeans colonized the New World they, of course, brought their culture with them, including this transmogrified and much attenuated relic of the ancient Saturnalia. They found in the new agricultural products they received from the Indians materials that could be adapted for the old observances: corn grains to rattle in startling showers against window-panes; pumpkins that could be hollowed and carved and fitted with candles to make grinning heads of fiery demons.

It's a far cry from the legendary Golden Age of Saturn, when nobody had to work and everybody could do just as he pleased, to present-day pranksters with jack-o'-lanterns, and many of the connections are not at all clear, but children, those severest of traditionalists, still hang onto what they can remember of the ancient ritual.

Science News Letter, October 27, 1945

PSYCHOLOGY

Food for Europe Urged By Psychologists

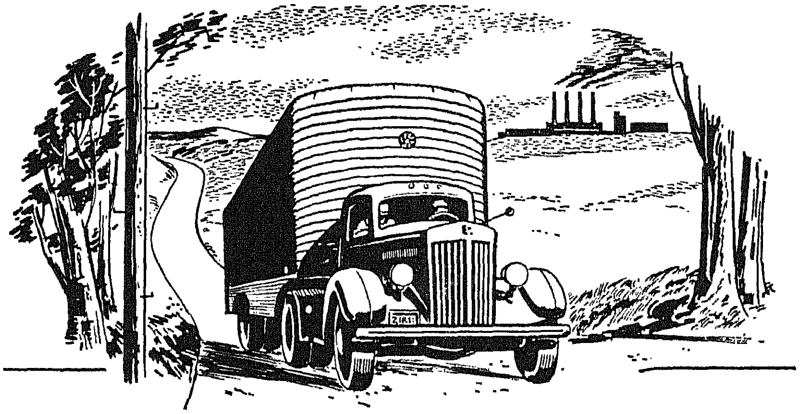
➤ IF OUR peace is not to be wrecked, food must be sent now to the hungry people of both Europe and Asia as a preventive of World War III. This is the decision of the Council of the Society for the Psychological Study of Social Issues, as announced by Prof. Theodore Newcomb, of the University of Michigan.

Starvation and misery, especially in childhood, sow the mental seeds for future wars, the psychologists agree.

An insurance against another world war, this group of scientists advocate the following steps: 1. Back a program of aid in Europe and Asia; increase the allocations of food. 2. Support OPA controls (on meats, fats, oils, sugar, fuels, etc.) as needed to implement the program. 3. Advocate immediate use of surplus Army trucks, planes and fuel for transportation of food. 4. Vote an appropriation of $550,000,000, the balance already pledged to UNRRA, and authorize an additional contribution of $1,350,000,000, as recommended in President Truman's message of Sept. 6 to Congress.

Science News Letter, October 27, 1945

BETTER GASOLINE IS HERE!



You can utilize today's gasoline quality to pay extra dividends in power and economy

BETTER GASOLINE is no longer a hope — it's a reality. Gasoline companies are now supplying gasoline with improved base stock and higher octane ratings.

This high-quality fuel will be of great value to truck operators, who are faced with the changing conditions of the postwar world—heavier competition in the truck field, demand for better service, and the need for lower ton-mile operating costs. *Higher octane gasoline, used to full advantage, can help provide the extra power, performance and economy needed to solve these problems.*

In ordering new equipment, you'll want to specify compression ratios to utilize better gasoline. Many engines now in service can also be brought up to date—can be modified to utilize improved antiknock value.

By keeping pace with gasoline improvements you will be taking a long step toward more economical operation per ton mile.

More power from every gallon of gasoline and
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AERONAUTICS

Air Supremacy Struggle

Now confronts aircraft manufacturers of all nations. Even an inland country possessing flying fields or lakes can be formidable competitor in postwar commerce.

➤ THE PROPOSED purchase of several Martin Mars seaplanes by Swissair, official airline of Switzerland, brings home the reminder that air commerce is not limited to those nations whose place in air shipping has been established, and that even an inland nation possessing flying fields or a lake can be a formidable competitor in postwar commerce. Daily air service between Geneva, Zurich and Paris is to be resumed; reciprocal rights agreement for American and Swiss airlines across the North Atlantic, and Swissair's expected nonstop operations from New York to flying boat bases on Lake Lucerne or Lake Geneva indicate that lack of size, world importance and even geographic locations are not retarding factors in the race for commercial air supremacy. Typical of postwar passenger and cargo planes, the Mars, capable of carrying cargo in excess of 35,000 pounds, can easily fly scheduled nonstop flights from America to Switzerland seating 132 passengers.

That France intends to enter the field is evident by the recent test flight of a six-engine, 40-passenger flying boat, said to be capable of remaining in the air for periods of 20 hours. One of England's entries, the Avro Tudor, four-engined luxury liner, sleeping 12 passengers, claims a maximum range of 4,660 miles and speed approaching 300 miles per hour. In addition to the Hermes Cargo Carrier, Handley Page has also under construction a 50-passenger transport. The 70-passenger Shetland, having a greater wingspread than the B-29 Superfortress, will be in service as well as the commercial version of the Short Sterling night bomber as an 18-passenger liner.

Before the war, airlines in this country had introduced pressurized cabin planes on scheduled flights at sub-stratosphere altitudes. On the drawing boards of aircraft manufacturers were other ships whose development was all but forgotten in the production of war planes. Republic's first commercial plane, the 40-passenger Rainbow, powered by four Pratt-Whitney engines totaling 12,000 horsepower, is believed by its designers to reach a speed of 400 miles an hour when put into operation. Lockheed's famed Constellation is already in service, as are Douglas DC-4s, perhaps better known in its Air Transport Command version, C-54. Consolidated-Vultee expects to outperform any ship in the skies with its giant 204-passenger super-clipper on order by Pan American Airways. The 10-passenger helicopter PV-3, built by the P-V Engineering Forum, Inc., landing in a 100-foot-diameter clearing on either land or water, opens new fields for feeder lines into formerly inaccessible areas.

Simple conversion of Consolidated-Vultee's Liberator, Privateer and the new Dominator, together with Boeing's B-29, to peacetime transport will place America easily in the lead without a struggle for new design or drastic engineering changes.

Science News Letter, October 27, 1945

The *Shu King*, the oldest known scientific work, states that 2,000 years before the present era, the Chinese determined the seasons, and the positions of the sun at the equinoxes and solstices.

Peanuts, formerly produced merely for the edible nuts, are now grown for peanut butter, oil and oil cake; their shells, finely divided and bonded with an adhesive, are used in bottle caps, replacing cork.

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• Books of the Week •

➤ THE SMYTH REPORT, formally ATOMIC ENERGY FOR MILITARY PURPOSES, by H. D. Smyth, is now available in board covers (*Princeton Univ. Press*, $2). Notices of the reprinting of significant excerpts in *Chemistry*, and of the full text as a paper-covered Government publication, have already appeared in THE SCIENCE NEWS LETTER.

Science News Letter, October 27, 1945

➤ MALARIA has perforce been brought to the fore in our national consciousness during the past few years. This if nothing else, should insure a large readership for Norman Taylor's CINCHONA IN JAVA, a brief, vividly written, neatly illustrated history of the one natural source of malaria-controlling drugs. (*Greenberg*, $2.50.)

Science News Letter, October 27, 1945

➤ NORTH AMERICANS are interested in plants that are grown, or may be introduced, in the warmer lands to the south: hevea and cinchona, abacá and cubé, palm nuts and cherimoyas. The stories of these and many another product of the tropics, often touched with drama, are well told by 14 recognized authorities in a symposium volume: NEW CROPS FOR THE NEW WORLD, edited by Charles Morrow Wilson. (*Macmillan*, $3.50.)

Science News Letter, October 27, 1945

➤ WHEN YOU see a hyacinth or an iris or a delphinium, do you stop to think where the name originated? Many plant and animal names hark back to classical antiquity; knowing their sources adds to the intellectual and esthetic satisfaction of acquaintance with the creatures themselves. For this reason, biology teachers will welcome a new booklet by Dr. P. H. Yancy: ORIGINS FROM MYTHOLOGY OF BIOLOGICAL NAMES AND TERMS, which gives in alphabetic order brief characterizations of the mythological figures for whom plants and animals have been named, together with names of the organisms themselves. (*F. G. Brooks, Mount Vernon, Iowa*, 20c.)

Science News Letter, October 27, 1945

➤ PERSONS WHO desire a general background relative to radio, radar, high-frequency heating, television and other recent developments in which electronics play a part, will find it in FUNDAMENTALS OF ELECTRONICS, by Henry Lionel Williams. It is a simply written, not too technical treatment for those who have some electrical background. (*Blakiston*, 69c.)

Science News Letter, October 27, 1945

➤ A TECHNICAL treatment of petroleum chemistry in its analytical aspects is given in CHEMICAL CONSTITUENTS OF PETROLEUM by A. N. Sachanen. It emphasizes the so-called ring analysis developed by Waterman and the possible wide application of ring analysis. It is a book for advanced students. (*Reinhold*, $8.50.)

Science News Letter, October 27, 1945

➤ FIRST PRIZE for unpopularity among insects would undoubtedly be voted to the mosquito; on this score, at least, Thomas J. Headlee's THE MOSQUITOES OF NEW JERSEY AND THEIR CONTROL (*Rutgers Univ. Press*, $4), would hardly be rated as a popular book. It is certain to be popular, however, with mosquito control officers and with entomologists generally, for its full and accurate descriptions and good line illustrations of even obscure and relatively unimportant species, as well as for its adequate discussion of practical means for the abatement of the more numerous and troublesome ones.

Science News Letter, October 27, 1945

• Just Off the Press •

ALMIGHTY ATOM: The Real Story of Atomic Energy—John J. O'Neill—*Washburn*, 91 p., $1.

AN ANNOTATED CHECKLIST AND KEY TO THE SNAKES OF MEXICO—Hobart M. Smith and Edward H. Taylor—*Smithsonian Institution*, United States National Museum Bulletin No. 187, 239 p., 50 cents.

ASTRONOMY: The Solar System—Henry Norris Russell, Raymond Smith Dugan and John Quincy Stewart—*Ginn*, 470 p., illus., $3. A revision of Young's Manual of Astronomy. This book fills the gap between elementary work and use of highly technical original papers.

ATOMIC ENERGY IN THE COMING ERA—David Dietz—*Dodd*, 183 p., illus., $2.

THE BIRDS OF NORTHERN THAILAND—H. G. Deignan—*Smithsonian Institution*. United States National Museum Bulletin No. 186, 615 p., $1.25.

CATALYTIC CHEMISTRY—Henry William Lohse—*Chemical Pub.*, 471 p., illus., $8.50. The nature and properties of catalysts, as well as industrial catalytic reactions are discussed in detail in this book.

INTRODUCTION TO INDUSTRIAL CHEMISTRY—W. T. Frier and Albert C. Holler—*McGraw*, 368 p., illus., $1.75. An elementary course designed for the use of those who have had little scientific background.

RECENT OCCUPATIONAL TRENDS IN AMERICAN LABOR—A Supplement to Occupational Trends in the United States—Dewey Anderson and Percy E. Davidson—*Stanford Univ.*, 133 p., cloth, $2.25; paper, $1.50.

SCIENCE OF THE SEVEN SEAS—Henry Stommel—*Cornell Maritime*, 208 p., illus., $2.50. A fascinating, non-technical introduction to natural phenomena observed at sea.

THE U. S. MARINES ON IWO JIMA—Capt. Raymond Henri, Lt. Jim G. Lucas, T/S W. Keyes Beech, T/S David K. Dempsey and T/S Alvin M. Josephy, Jr.—*The Infantry Journal*, 312 p., illus., 25 cents.

VIRUS AS ORGANISM: Evolutionary and Ecological Aspects of Some Human Virus Diseases—Frank MacFarlane Burnet—*Harvard Univ.*, 134 p., $2.

Science News Letter, October 27, 1945

CHEMISTRY

Vitamin C Helps Frozen Peaches Keep Their Color

➤ ADDING a little ascorbic acid, or vitamin C, powder to the syrup in which peaches are packed for freezing will prevent unsightly discoloration, reports the New York State Agricultural Experiment Station. One gram of the ascorbic acid powder, which also increases the nutritive value of the peaches, is sufficient to prevent five pints of sliced fruit from browning.

Science News Letter, October 27, 1945

CHEMISTRY

Perkin Medal Awarded Dr. Francis C. Frary

➤ THE PERKIN medal, the highest award of the American section of the Society of Chemical Industry goes this year to Dr. Francis C. Frary, director of research of the Aluminum Company of America for his outstanding work in the field of industrial research.

The presentation of the medal will take place on January 11 at a special dinner meeting of the society.

Science News Letter, October 27, 1945

NEW "PICK-UP" CANE

Permits Disabled Persons To Pick Up Small Articles Without Painful Stooping.

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W. H. MASON Box 27, Leesburgh, Ohio

New Machines and Gadgets

WALLPAPER ROLLS, recently patented with adhesive on one side and a water-resistant finish on the decorated side, can easily be applied by the housewife. The pre-pasted roll is cut in proper lengths, re-rolled loosely with the decorated side out, dunked in water, and unrolled in place on the wall.

Science News Letter, October 27, 1945

HOME-MADE up-ender, to stand heavy drums on their ends, was constructed in one plant from an old double-acting cylinder type of air hoist and a three-way valve. Drums are rolled over the hoist, air pressure applied, and they are quickly up-ended.

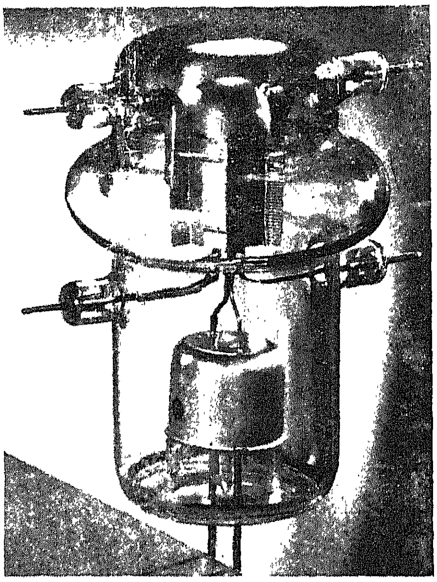
Science News Letter, October 27, 1945

VISCOUS liquid, purchasable in containers for home and laboratory use, sets in simple molds to a hard, heat-resistant plastic for such objects as doorknobs or electrical instrument bases. It holds its shape when once set, and is resistant to oils, greases and most chemicals.

Science News Letter, October 27, 1945

MASSAGE apparatus has dual roller applicators that turn toward each other to combine a pinching and squeezing effect. Each applicator is composed of three equidistant rolls so that at least one roll is always in contact with a removable textile apron that separates applicator and surface to be massaged.

Science News Letter, October 27, 1945



MEASUREMENT lamps, to gauge the power output of electronic and radio communication equipment, have two identical small filaments mounted in lock-in type bases, one of which is shown in the picture. One filament carries the high-frequency current, the other an ordinary current regulated until both filaments are equally bright.

Science News Letter, October 27, 1945

POWER FEEDER, attached to the column of a drill press, automatically duplicates the operations of a mechanic when deep-drilling small holes. It can be set to retract the drill for full chip clearance at a pre-selected point.

Science News Letter, October 27, 1945

CEMENTED carbide strip set in a wooden block is used to mark laboratory and other glass, replacing the use of files. The carbide edge can be used for weeks, being much harder than any glass, and is particularly suitable for marking thermometers.

Science News Letter, October 27, 1945

PENCIL-BONDED pocket memorandum pad resembles the ordinary pad in a flexible cover, but has a recess on its open end to hold in place a flexible clip on the pencil. The clip fits over the end of the pad to hold it closed while a tiny pocket on the pad holds the pencil point.

Science News Letter, October 27, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 282.*

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Question Box

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CHEMISTRY

From what is the new, improved plastic made? p. 262.

What vitamin helps frozen peaches to keep their color? p. 271.

GENERAL SCIENCE

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MEDICINE

How successful has promin been as a weapon against leprosy? p. 261.

What virus acts like a poison as well as a germ? p. 264.

METEOROLOGY

How may radar increase the knowledge of meteorology? p. [illegible]

ORNITHOLOGY

How may civilians obtain first-class Army carrier pigeons? p. 262.

PHYSIOLOGY

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What enables a person to see with ultraviolet radiations? p. 261.

PUBLIC HEALTH

What is the fundamental treatment for TB? p. 262.

Where published sources are used they are cited.

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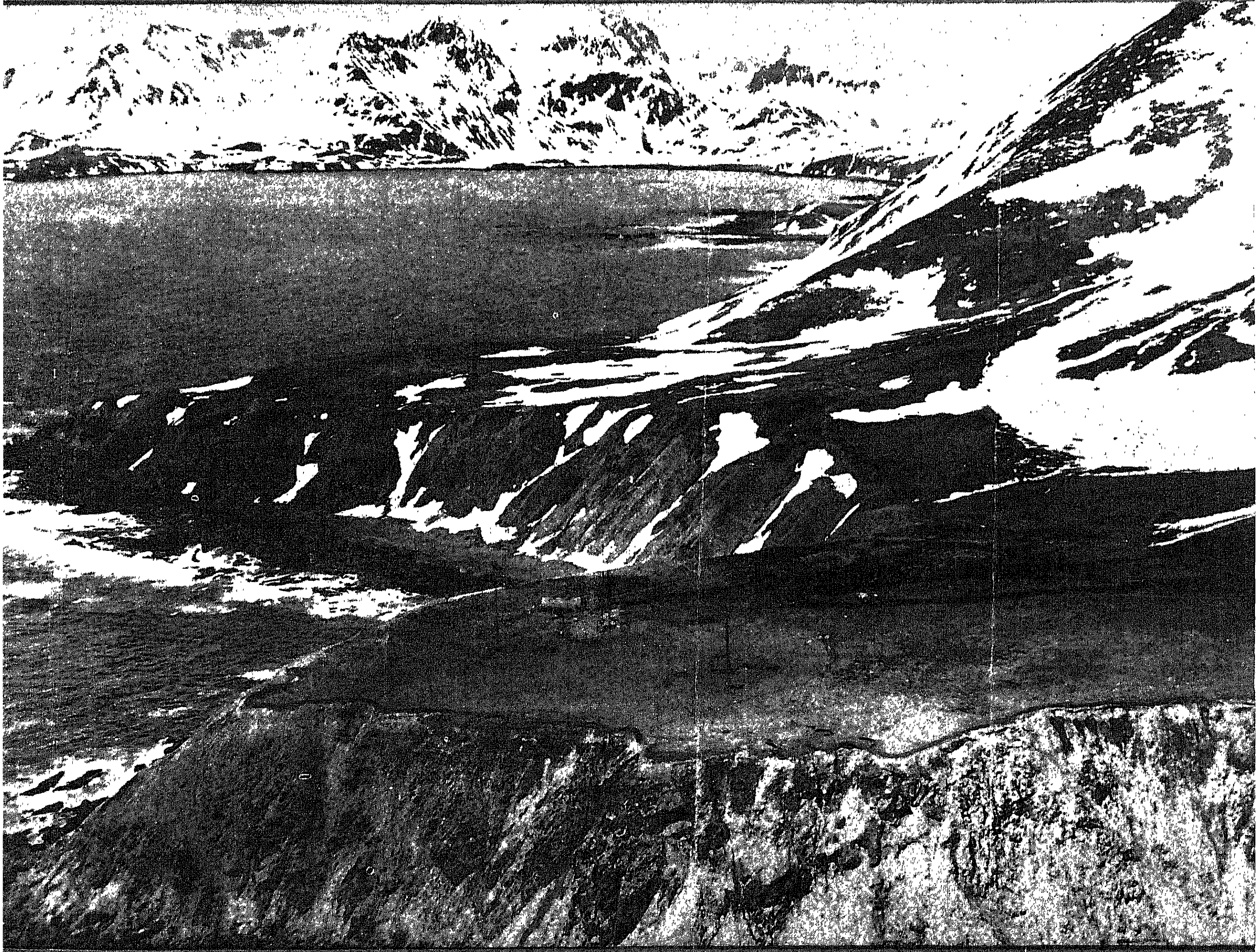
THE WEEKLY SUMMARY OF CURRENT SCIENCE • NOVEMBER 3, 1945



"Loran" Unit

See Page 275

A SCIENCE SERVICE PUBLICATION

PHYSICS

Banish Atomic Dangers

This must be done before peaceful applications can be made. New weapons are believed to be sufficiently terrible to bring peace to the earth.

➤ PEACETIME application of atomic energy or any other scientific research activity will be of no importance whatever to the human race unless the danger of atomic bombs is banished from the earth, Dr. Harold C. Urey, Nobelist in chemistry, formerly of Columbia University and now of the University of Chicago, one of the scientists who worked on the atomic bomb, declared at the American-Scandinavian Foundation luncheon in New York, commemorating the birthday of Alfred Nobel.

The atomic bomb, in Dr. Urey's opinion, is sufficiently terrible to make possible the bringing of peace to the earth, a still unfulfilled hope of Nobel who invented dynamite.

Explaining that even if no improvement were made in the present atomic bomb a thousand of them, if properly placed, would destroy 33 cities of the size of New York, Dr. Urey suggested that with sufficient effort 10,000 bombs could be manufactured as a result of future improvements in known processes.

"If atomic bombs are used in the next war it seems certain that all the principal cities of the world, including those of the United States, will be utterly destroyed, and their inhabitants killed," said Dr. Urey.

By one means or another, Dr. Urey declared, the world must assure that no atomic bombs are made anywhere in the world. None must be in the possession of any government of any kind. We may be sure that if atomic bombs are made in one country they will be made in all industrial countries of the world, and if atomic bombs are made in all these countries the whole world will spend all its days in deadly fear that they will be used. In time, Dr. Urey added, they undoubtedly will be used.

Quoting Maj. Gen. Leslie R. Groves, the Army's director of the atomic bomb project, that it would take from five to ten years for other countries to make atomic bombs, Dr. Urey gave his opinion that if the United States published all its atomic bomb data in detail, it would not shorten the time of foreign production by very much. This is true because it takes time to build plants, and it takes time to operate them.

Much more important than the question of the so-called atomic bomb secret is the policy back of it, Dr. Urey declared, asking:

"Do we intend to engage in an armament race with other countries of the world?"

The only possible solution of the atomic bomb dilemma, Dr. Urey declared, is a superior world government of some kind possessing adequate power to maintain the peace with the various divisions of the world relatively disarmed. This will involve a most efficient inspection service which will detect and report promptly any attempt to produce atomic bombs or other heavy arms and a sufficient police force to prevent such activities. Under this plan neither the countries of the world nor the United Nations organization will have atomic bombs and no one will need to fear them.

Science News Letter, November 3, 1945

MEDICINE

Athlete's Foot Remedy

Undecylenic acid, zinc salt and ordinary talc are mixed into a dusting powder for prevention of the fungus infection and treatment of mild cases

➤ A NEW remedy and preventive of athlete's foot has been announced by the Navy Department. Chief active ingredient is undecylenic acid, a fatty acid found in sweat.

This acid, its zinc salt and ordinary talc are mixed into a dusting powder for prevention of athlete's foot and treatment of mild cases. Undecyclenic acid and zinc undecylenate in a carbowax base, with water, propylene glycol and triethanolamine makes an ointment for more severe cases of the fungus infection of foot and groin.

The undecylenic preparations proved better than a number of other standard preparations used to combat athlete's foot, including boric-salicylic powder and propionic acid preparations.

Tests involving more than 5,600 Navy men at Fort Pierce, Vero Beach and Melbourne, Fla., were conducted by Comdr. Henry C. Shaw (MC), USNR, of Rochester, N. Y.

Fungus infection of the foot, popularly called "athlete's foot", developed in 28% of trainees who used no prevention. Regular dusting with the new powder cut this to 4%. Under the same conditions 15% developed infection while using powder containing boric and salicylic acids, long a standard preparation for this purpose. Groin infections were cut from 10.3% to 0.7%.

Used as a powder for mild infection and as an ointment for more severe cases, the new preparations proved their value in curing as well as preventing infection. The ointment cured about 90% of moderate and severe foot and groin infections in two or three weeks, and the powder was much more effective than boric-salicylic powder in treating milder cases.

Fungus infections have been among the most stubborn medical problems in the Pacific war, accounting for as high as three-quarters of all sick-bay calls at some tropical bases. Some standard remedies, useful at home, were too irritating in the steaming islands, and none were effective enough to prevent large numbers of men from being kept out of action.

Searching for something better, Comdr. Shaw and two other Naval Reserve Medical Officers, Comdr. Marion B. Sulzberger of New York City and Lt. Comdr. Abram Kanof of Brooklyn, tested several preparations in a careful study in New York City. Undecylenic powder and ointment seemed the best. But because climate and living conditions are important factors in skin diseases, they had to be tested under field conditions in a tropical or subtropical climate.

Science News Letter, November 3, 1945

Peaches, pears, plums and apples may be canned with honey, in whole or part, instead of sugar, resulting in a delightful distinct flavor.

Harbor seals now are found from Massachusetts to the Arctic, and occasionally off Long Island where they were once abundant.

RADIO

"Loran" Guides Pilots

Vast network using radio, not radar, covers over three-tenths of earth's surface. Locates pilot of plane or ship within a mile or two regardless of weather.

By WATSON DAVIS

See Front Cover

➤ SHIPS and planes plying the international air and sea lanes can locate their positions accurately to within a few thousand feet by means of the "loran" navigation system developed and constructed by joint effort of scientists of the Radiation Laboratory of the Office of Scientific Research and Development, U. S. Navy's Hydrographic Office, Coast Guard, and the United States Army Air Forces.

One of the most tightly held secrets of the war, loran consists of a vast network of radio stations which in effect spread into space an electric stop watch accurate to a millionth of a second. By means of a little box, which aboard airplanes weighs only 35 pounds and should cost about $500 in peacetime production, dancing green lines on a cathode ray tube read by the navigator allow him to place the location of his craft with as great accuracy as is provided by celestial navigation based on shooting the stars or the sun with a sextant.

First put into actual operation late in 1942, loran was one of the secret weapons in fighting German submarines in the Atlantic. Later, as the war was carried to other parts of the globe, loran went to the fighting fronts in the air and on the sea with its radio impulses extending over enemy-held territory in order that bombers and ships alike might navigate safely. Now 70 loran stations spray their signals over three-tenths of the earth's surface. A total of 90,000 loran receiving boxes were ordered for war use on ships and aircraft.

The loran network is an excellent example of successful international cooperation during the war, which, American authorities are confident, can be continued in the peace years if the present stations can be kept in operation and various nations will cooperate in providing new service in the areas which they control. To date the American, British and Canadian governments are operating stations and using the signals for navigation. To operate a station costs approximately $100,000 a year and about $8,000,000 a year would be the world cost of providing this essential and superior navigation aid.

Loran is not radar, but it does use radio. By comparing two radio signals from stations separated by about 400 miles, a navigator can locate exactly the position of the craft on the sea or in the air. Simple charts or tables are used.

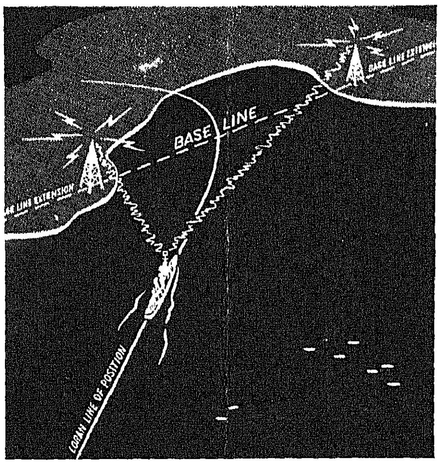
The determination of position is based upon very accurate measurement of the difference in the time of arrival of signals from two radio stations operating on a frequency just above the broadcast band. The part of the radio spectrum used is that formerly used by amateurs. Signals of the two transmitting stations are precisely synchronized.

Great Accuracy

The loran receiver determines with great accuracy the difference in the time at which the two signals from the loran transmitting stations are received. Curves are printed on a navigation chart showing the loran lines of position for various time differences. These sweep around the transmitting station's location in the form of hyperbolas. Since the areas of frequent travel by ships and planes are blanketed by the loran signals from several transmitters, the navigator can determine three or four or more such lines of position. Where these lines cross gives the point known as a "fix" which represents on the navigating chart just where the craft is located.

Loran gets its name from the fact that it is a long range aid to navigation (*lo* from long, *r* from range, *a* from aid, and *n* from navigation).

In the daytime loran can be relied upon for 700 miles from the transmitting station, while at night, thanks to the reflection of the signals in the 160-meter band by the ionosphere, reliable determinations of position can be made at twice the maximum daytime range of the transmitters.

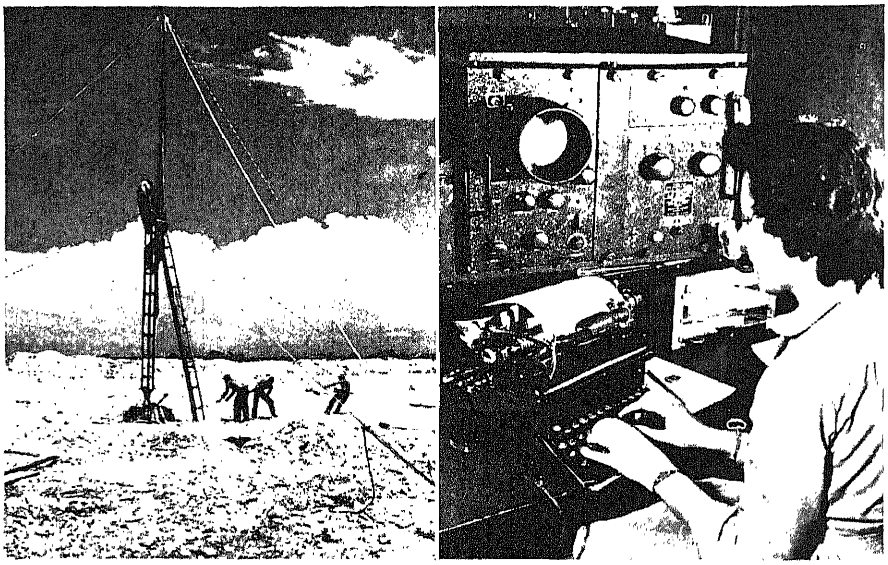


ACCURATE—"Loran" enables navigators to place their locations with as great accuracy as is provided by celestial navigation based on shooting the stars or the sun with a sextant. This diagram shows how the impulses go out to ships and planes.

In the fight against submarine warfare, loran was used extensively to enable a ship and an airplane to meet each other. Often in those dark days of the war ships sailed for three and four days, often across the entire Atlantic, relying solely on loran and conventional dead reckoning, because the stars and the sun could not be "shot" in the conventional navigation manner during bad weather. Loran proved much more accurate and safer to use than the ordinary methods of dead reckoning.

Successful use of airplanes in the foggy Aleutians was due very largely to the installation of loran systems in that area. Loran network and navigation not only kept many transports and cargo planes flying safely but guided bombers and other fighting craft over the Hump in China. As the push was made at extraordinary speed across the Pacific toward Japan, installations of loran stations kept up with the advance. The B-29s that bombed Japan, including the areas of the atomic bombs, were guided on their missions by loran. Altogether about $100,000,000 was spent on loran equipment and installations, but most of this expenditure can be considered an investment for use in building up a world navigation system for sea and air. The cost of research proved to be relatively small, only about 1% of the total.

Only the most severe electrical storms which create a large amount of static will



"LORAN" IN ACTION—On the right is the Loran receiver indicator in use at a monitor station. On the left, a vertical radiator is being erected.

make loran unusable, and accurate positions can be determined even under conditions when other radio signals cannot be deciphered.

The development of loran began in 1940, and it was in an advanced experimental state at the time of Pearl Harbor. The first navigational network was put in operation on Oct. 1, 1942. By the end of 1942, 40 vessels of the Atlantic fleet were fitted with receivers. When the Coast Guard, acting for the Navy, took over the operation of ground transmitting stations in June, 1943, the system was well on its way towards world wide use. In 1943 the Army began installing airborne receivers on bombers.

The British pioneered in developing a pulsed hyperbolic navigation system which they call "Gee" and this method was used in navigating the relatively shorter flights of the RAF over Europe. The inventor of the British system is R. J. Dippy, a small, quiet, former school teacher who worked at the British Telecommunication Research Establishment where major work was also done on radar. Mr. Dippy spent six months collaborating with the American scientists who were developing loran. Loran as developed through American efforts with British cooperation has been put to use not only by our fighting forces, but also the Canadian Navy, the British Navy, and the RAF. Plans are under way whereby loran stations established in other countries, such as Australia, will be taken over and operated by those countries. Canada is already operating stations in Canada.

Principal research and development work on loran was done at the OSRD's Radiation Laboratory of Massachusetts Institute of Technology where Melville Eastham of the General Radio Company of Cambridge, Mass., Dr. J. C. Street of Harvard, J. A. Pierce of Harvard, Dr. J. A. Stratton of M. I. T., and D. G. Fink of Electronics magazine were the principal persons involved. Charts and tables used in loran navigation were produced by the U. S. Navy's Hydrographic Office with Lt. Comdr. F. G. Watson, USNR, formerly at the Radiation Laboratory and earlier on the staff of the Harvard College Observatory, in charge of this work. The U. S. Coast Guard assigned to Capt. L. M. Harding the principal responsibility for supervising the installation of loran transmitting facilities; while the application of loran to air warfare was the work of Maj. Gen. H. H. McClelland and Maj. J. M. Hertzberg. Comdr. Arthur F. Van Dyck, USNR, formerly with RCA, supervised for the Navy the planning of the world-wide network of loran.

The U. S. Coast Guard in conferences to be held shortly is urging the application of loran to merchant marine use as well as for overseas air transport. Along with radar, loran promises to be one of the most important applications of electronics to safety on the sea and in the air. Not only does it provide continuous safe navigation, but permits greater payloads through lower fuel reserve by aircraft.

To give adequate coverage over the travelled areas of the sea and the air a world-wide network of some 150 loran stations would be needed and the maintenance of these is estimated to cost about $20,000,000 a year. Each loran station would cost about $100,000 to construct and about the same amount to operate for a year. Authorities point out that if in addition to fuel savings, safety is increased, resulting in saving of life and property, by the operation of this world system each year, such an annual expenditure would be worthwhile.

Science News Letter, November 3, 1945

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RADIO

Radio Reception Forecast

Predictions made twice a week at National Bureau of Standards were furnished during the war to Army and Navy. Now available to public.

➤ LIKE the weather man, radio experts are "sticking their necks out" in an attempt to predict several days in advance if the radio reception on short-wave sets will be good or bad.

A prediction can be made on Wednesday, for example, that owners of short-wave radio sets will probably have trouble the following Monday and Tuesday getting programs broadcast from Moscow, Stockholm and London.

The semi-weekly forecasts, furnished the Army and Navy during the war, are issued by the Interservice Radio Propagation Laboratory at the National Bureau of Standards. During a magnetic storm, high-frequency transmission may be upset. If the storm becomes violent, however, the reception of local broadcasts may become poor and telegraph messages fail to get through.

The first radio paths to become disturbed are those crossing the polar regions such as from New York City and Washington to Moscow, Stockholm and London.

The predictions are based in part on the degree of solar activity. The greater the number of sunspots—and the public is once again to get up-to-date information on sunspots—the more likelihood there is of a magnetic disturbance.

Disturbance in the ionosphere, the complicated layer more than 50 miles high from which radio waves are reflected back to the earth, are associated with the magnetic storms at lower levels. Thus conditions of the ionosphere as well as geo-magnetic and auroral conditions are all studied in venturing a guess as to just how good the high-frequency reception will be several days in the future.

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AERONAUTICS

Jet-Push Plus Propellers

Combination of conventional propeller-drive and jet-propulsion features new Navy fighting plane; powered by two engines operating together or alone.

➤ SOMETHING new in aircraft propulsion, a new Navy fighting plane equipped both with conventional propellers driven by a reciprocating engine and jet-push from an improved jet propulsion engine, was demonstrated in Washington before a group of scientists by the U. S. Navy, which also released many of the details of the plane and its power plants.

The two engines may be operated at the same time, to give maximum performance, or either may be operated alone. The unique power combination makes the plane equally efficient at high or low levels. It also combines the advantages of good cruising characteristics with high tactical performance.

The reciprocating engine, a Wright Cyclone radial power plant, is in the front of the plane, and the jet-propulsion engine, made by General Electric, is in the rear. This gives an even weight distribution that contributes to the plane's efficiency. The plane, already dubbed the "Fireball," is a low-winged, single-seat monoplane that at first glance appears to be a single-engine craft. Both engines are completely enclosed, and air scoops for the forward engine are within the engine cowling. The air intakes for the jet engine are in the leading edge of the wing near the fuselage, with the jet exhaust opening coming out under the tail.

This new plane is a product of the Ryan Aeronautical Company of San Diego, Calif., and when the war ended was beginning to roll off the production line. A Navy fighter squadron to be equipped with Fireballs was already in pre-combat training when the Japs surrendered. The Fireball never saw combat, but already the principles developed for its operation are being applied to a possible civilian version.

The General Electric-designed thermal jet engine in the Fireball is far more powerful than a conventional engine of the same weight; working alone, it can streak the plane along at approximately 300 miles an hour. The Wright Cyclone gives the craft a maximum range of 1,500 miles cruising at 207 miles an hour, and can develop a speed of 320 miles an hour. Operational features of the plane are good maneuverability, fast climbing, easy handling and speed.

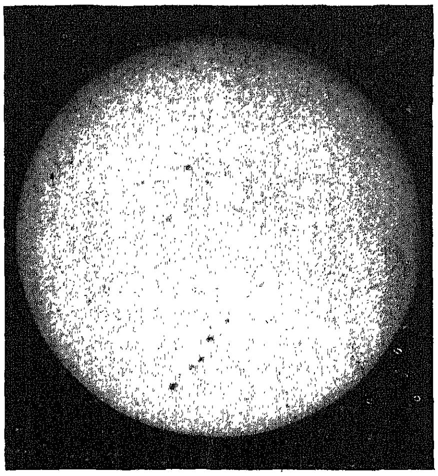
Science News Letter, November 3, 1945

CHEMISTRY

Shark-Repelling Chemical Used for Mackerel Nets

➤ THE SHARK-REPELLING chemical which was developed during the war to save the limbs and lives of "dunked" flyers and sailors promises to be a major money-saver to commercial fishermen. A test made at the suggestion of the U. S. Fish and Wildlife Service by the mackerel seiner *Angie* and *Florence,* operating out of Gloucester, Mass., showed that it was effective in keeping these toothy raiders away from a large net full of mackerel, saving both fish and net.

Shark attacks on heavy netfuls of fish have long been a major problem of commercial fishermen. The loss in fish is serious enough, but damage to the net may be even more so, for a good mackerel net costs several thousand dollars.



NOT A SECRET—The second largest number of sunspots for the year is shown in this photograph by the U. S. Naval Observatory. There are not many large spots, but numerous small ones. The more spots, the more activity there is on the sun. Information about sunspots is no longer a war secret and can be obtained from the Observatory.

Results of the test were reported by Alfred Piscatello, crew member aboard the *Angie* and *Florence*. The vessel had circled a school of mackerel in its long net, when sharks were observed circling near. Two blocks of the shark-chaser were sunk to a depth of 20 or 30 feet in a weighted container, and towed around the net. Additional chemical was spread on the water close to the net. The sharks headed for the catch, but when they came to the black "slick" on the water formed by the chemical they hastily turned tail and swam away.

One shark was caught in the net. Ordinarily this would have resulted in serious damage, for a netted shark lashes out furiously in efforts to escape. But this shark was very much subdued and was easily lifted out by hand.

Science News Letter, November 3, 1945

MARINE BIOLOGY

DDT Fails to Check All Ship-Fouling Organisms

➤ DDT, THOUGH proven able to prevent barnacles from growing on submerged steel plates, is nevertheless of little value as the main active ingredient for anti-fouling paints to be used on ships' bottoms, G. W. Seagren, M. H. Smith and Dr. G. H. Young of the Mellon Institute declare. (*Science,* Oct. 26). They base their conclusions on an eight-month series of experiments on the Florida coast, where the anti-fouling effectiveness of paints containing DDT and the time-honored anti-fouling copper compounds were compared.

In these experiments, as in earlier ones by other workers, the DDT did prove effective in preventing barnacles from taking hold on the steel test panels. The catch lies in the fact that barnacles are not the only organisms that foul up ships' bottoms. Other animals that help to form the troublesome crusts are included in several zoological orders: mollusks, annelids or jointed worms, hydroids, bryozoa and tunicates. The plant kingdom is represented in the growth complex by several kinds of algae or seaweeds. DDT had no measurable effect on any of these, save only barnacles, whereas a conventional-type copper-containing paint was effective against all of them.

The three researchers therefore conclude: "It thus seems unlikely that this toxicant (DDT) can effectively displace cupriferous and/or mercury pigments in the usual ships' bottom paints."

Science News Letter, November 3, 1945

ELECTRONICS

100,000,000-Volt Betatron

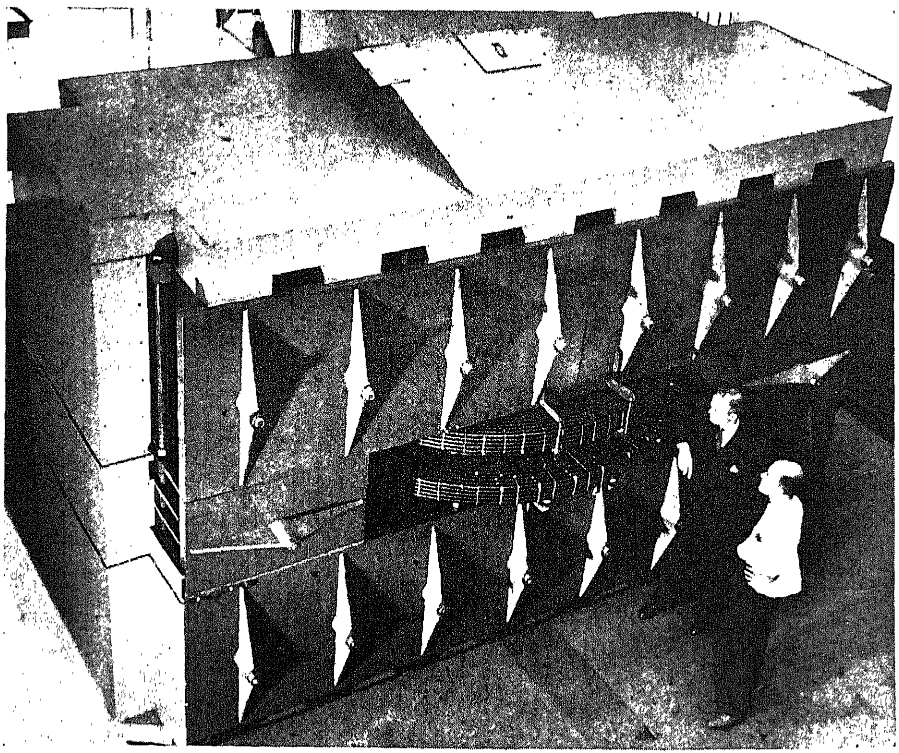
Details of this war-secret instrument are now revealed. It gives out X-rays of power never previously approached.

➤ DETAILS of the war-secret 100,000,000-volt electron accelerator, or betatron, were revealed at the General Electric Research laboratory in Schenectady to a group of newspaper science editors and technical writers who inspected the instrument.

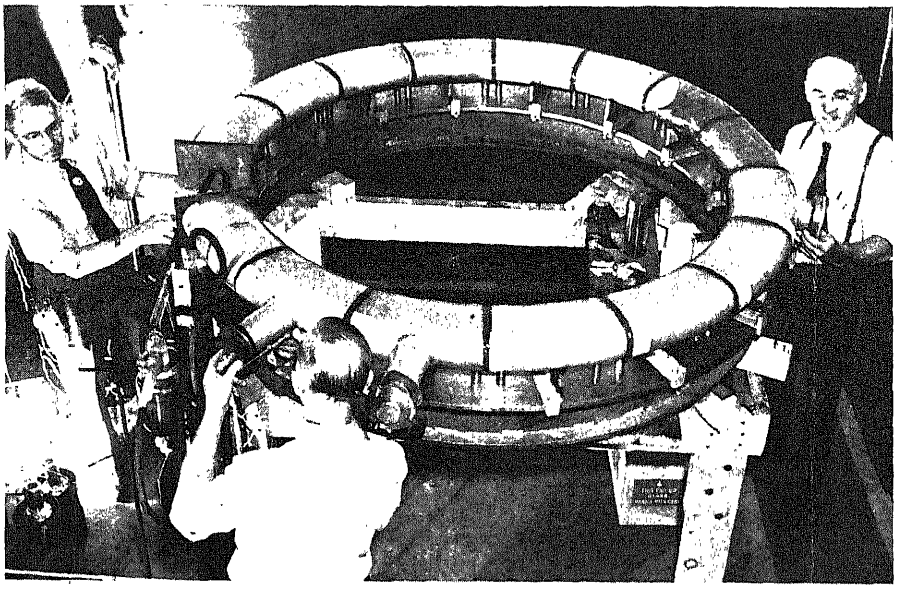
"The new machine gives out X-rays of a power never previously approached," declared Dr. C. G. Suits, director of the laboratory, "and these will penetrate a thickness of metal considerably greater than the rays of our 2,000,000-volt industrial X-ray unit. But even more exciting to us are the possibilities that with the 100,000,000-volt electron stream that produces X-rays of the same energy we can produce other interesting forms of radiation. In fact, we have now arrived at the stage where we can generate in the laboratory radiations which formerly were available only in the cosmic rays, and we are just passing the borders of an entirely new field of atomic research."

The principal part of the betatron is a huge electromagnet, made of 130 tons of laminated silicon steel. In a rectangular opening passing through the magnet from front to back are the pole faces, 76 inches in diameter, surrounded by large coils of insulated one-inch copper conductor. As electric current at 24,000 volts surges through these coils from a bank of condensers, the magnet is energized, the intense magnetic field being concentrated in the horizontal space between the pole faces.

The heart of the machine is a doughnut-shaped vacuum tube of glass. The doughnut has an over-all diameter of 74 inches, while the elliptical tube itself measures eight inches horizontally and



100 MILLION VOLTS—This machine will speed electrons to energies of 100,000,000 volts and produce X-rays of the same power. Dr. E. E. Charlton, left, and W. F. Westendorp are the two scientists at General Electric who have been responsible for the design and construction of this new super X-ray machine.



TUBE IS ASSEMBLED—The heart of the machine is this doughnut-shaped vacuum tube of glass. The doughnut has an over-all diameter of 74 inches, while the elliptical tube itself measures eight inches horizontally and five inches vertically.

five inches vertically. The inner surface of the tube is electrically conducting, so that it will not accumulate a charge that would upset the paths of the electrons within.

Projecting into the doughnut at one point is an electron gun, consisting of a heated filament from which electrons are boiled off. These have an initial impulse of several thousand volts to start them in their orbits inside the doughnut.

The machine operates on ordinary 60-cycle alternating current. Acceleration of the electrons is confined to the first quarter of each cycle lasting 1/240 of a second, during which the current goes from zero to its maximum in one direction. Then it goes back to zero, before building up in the opposite direction.

Just as the end of the quarter cycle is reached, a pulse of current passes through two smaller auxiliary coils on the pole faces. This causes the electrons to spiral away from their orbit and to hit a tungsten target. This causes the generation of X-rays. (See SNL June 3, 1944.)

Science News Letter, November 3, 1945

MEDICINE

Anemia Remedy

Newly synthesized vitamin, folic acid, gives a "definite upsurge of well-being" to weak, gaunt sufferers from this robber of red blood cells.

➤ PATIENTS weak, gaunt and waxy-white, whose blood was thinned to half or less the normal number of red cells, felt a "definite upsurge of well-being" as they gained fresh red blood from doses of a newly synthesized vitamin, folic acid, Dr. Tom D. Spies of the University of Cincinnati reports. (*Southern Medical Journal*, Nov.)

Associated with Dr. Spies in the studies, conducted at the nutrition clinic at the Hillman Hospital, Birmingham, Ala., were Dr. Carl F. Vilter, Mrs. Mary B. Koch and Mrs. Margaret H. Caldwell.

The synthetic folic acid which swiftly increased the number of immature red blood cells and brought the count of mature red cells and hemoglobin content towards normal is the first synthetic substance to produce this response.

The discovery of its effect is therefore hailed by the editor of the *Southern Medical Journal* as "another milestone in the study of macrocytic anemia."

Macrocytic anemia occurs not only as pernicious anemia but also with liver disease, pregnancy, sprue and pellagra. Liver and liver extract, dried hog's stomach, kidneys and brain have heretofore been the only substances which remedied this macrocytic anemia. Various B vitamins were tried by Dr. Spies and associates. These included niacin, thiamin, riboflavin, calcium pantothenate, inositol, pyridoxine, para-aminobenzoic acid, choline, pyridoxamine and pyridoxal. They had little or no effect.

Synthetic folic acid may not produce all the results that are obtained by doses of potent liver extract. Further studies may show whether this vitamin is the anti-pernicious anemia material in liver or closely related to it.

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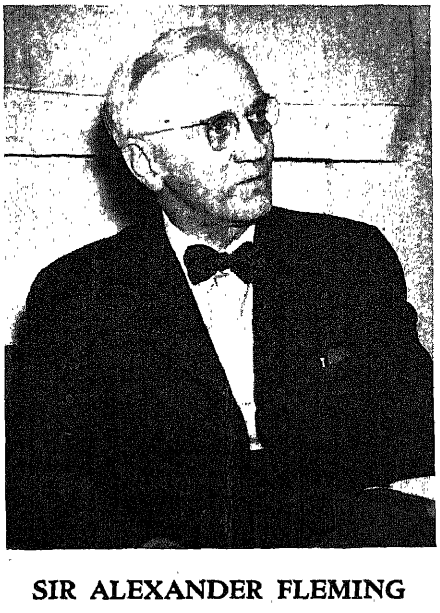
MEDICINE

Nobel Prize in Medicine Awarded for Penicillin

➤ THE NOBEL prize in physiology and medicine for 1945 has been awarded to Sir Alexander Fleming, discoverer of penicillin, and Sir Howard W. Florey and Dr. Ernst B. Chain, who fathered its development into a life-saving remedy. The story of penicillin has been brought to SCIENCE NEWS LETTER readers beginning with the announcement of its discovery (*SNL*, May 10, 1930), and in numerous other reports such as those in the following issues: Dec. 4, 1943; Mar. 24, 1945; May 29, 1943; July 4, 1942; Nov. 22, 1941.

Science News Letter, November 3, 1945



SIR ALEXANDER FLEMING

ZOOLOGY

Kangaroo, Pursued by Jeep Hops at 25 Miles an Hour

➤HOW fast can a kangaroo travel, by putting his tremendous leaps end to end?

Lt. Col. Anselm Keefe, Army chaplain now assigned to duty in the War Department after three and one-half years of service in the Pacific area, can answer that one. It's 25 miles an hour—if the kangaroo is scared enough. He knows, because he clocked a kangaroo himself, chasing it down the road in a jeep.

It happened while Col. Keefe's outfit, a medical unit, was in northern Australia, before Gen. MacArthur's big push up through the islands began.

"We were driving along a road with a high wire fence on either side when we came upon a mob of kangaroos," he relates. "The females promptly jumped over the fence to safety, but one big buck kept going right on down the road, as fast as he could jump.

"In civil life I'm a biologist, so I was curious to see just how fast the animal could travel. I told my driver to keep as close to him as he could, without danger of running into him, while I watched the speedometer. The indicator was holding steady at 25 miles an hour, when our kangaroo saw a small herd of horses in the pasture on the other side of the fence. With a 35-foot leap, he landed in the midst of them, where he knew from past experience he would be safe."

Science News Letter, November 3, 1945

BOTANY

Java Botanical Collections Little Damaged by Japs

➤JAPANESE occupation of Java did not cause any serious damage to the great collections of tropical plants, libraries on the plant sciences and other botanical installations in the Buitenzorg area, headquarters for the study of botany and its application in the Netherlands Indies. Correspondence received by Dr. Frans Verdoorn, editor of *Chronica Botanica* and Advisor to the Board for the Netherlands Indies, indicates that the Japs did not even carry off any of the scientifically valuable pressed specimens from the herbarium at the Buitenzorg Botanic garden.

The scientific staff, however, did not fare so well. Dr. C. G. G. J. van Steenis, well-known research worker on the botany of the Malayan region, tells of having been alternately interned and released during the war period. Six of the staff scientists are known to be dead, and the fate of several others is still unknown.

Despite the vicissitudes of his treatment at the hands of the enemy, Dr. van Steenis kept at his work as well as he could. He writes Dr. Verdoorn that he has almost completed a cyclopedia of botanical collectors, and also a book on Malaysian plant life, besides finishing several shorter scientific papers.

Science News Letter, November 3, 1945

PLANT PHYSIOLOGY

Chemicals in Soil Needed Around Peanut Plants

➤ PEANUTS burrow into the ground instead of developing on the branches of the vine as do the pods of most other legumes because the developing goober requires immediate contact with the nutrient chemical elements in the soil, Dr. L. D. Baver and a group of research associates at the North Carolina Agricultural Experiment Station have discovered.

The peanut has one of the strangest modes of growth of any crop plant. It belongs to the legume family, like peas and beans, and the nut is actually more like a pea than it is like a nut, so far as anatomical structure is concerned. The flowering stem that eventually produces the peanut starts on the vine, above ground, but it grows long and thrusts itself into the soil, where the peanut develops. This peculiar stem is known technically as the "peg."

In the experiments, the objective was to find whether the developing peanut required immediate contact with the soil, to obtain something it could not get indirectly through the sap stream from the roots. Peanut vines were grown with their roots in troughs of soil, duly supplied with fertilizer salts. The pegs were not permitted to sink into the same soil, but were given other soil in separate troughs, with different concentrations of the fertilizer elements.

It was found that for proper development the young peanuts required immediate contact with soil well supplied with lime. If the soil surrounding both roots and pegs was deficient in calcium, the kernels failed to develop, and most of the pegs produced hollow shells. When calcium was added to the soil around the roots only, it failed to have any effect on the nuts, but when it was added also to the soil around the pegs, the peanuts grew normally.

Science News Letter, November 3, 1945

IN SCIEN

CHEMISTRY

Penicillin Is Antitoxic As Well as Germ-Checker

➤ PENICILLIN gains new stature as a remedy against infectious disease as a result of studies reported by Dr. Alden K. Boor and Dr. C. Phillip Miller, of the University of Chicago. (*Science,* Oct. 26.)

The mold chemical has an antitoxic effect as well as the power to stop the growth of disease germs and even kill them. Doses of penicillin, the scientists found, can save mice from death that usually follows injections of the poison produced by one strain of meningococci, germs that cause meningitis. Although this poison kills 89 out of 100 untreated mice, only 33 out of 100 given the poison and treated with penicillin died.

The penicillin did not detoxify the meningococcus poison when mixed with it before injection, however. The scientists are now trying to find whether the detoxifying effect in the animal's body is due to penicillin or to some impurity in commercial preparations of it.

Science News Letter, November 3, 1945

ENTOMOLOGY-GEOLOGY

Florida Limerock Found Good Insecticide-Carrier

➤FINELY ground Florida limerock is found to be an excellent insecticide carrier, or diluent dust, and may be used for DDT, it is now revealed by the University of Florida where extensive tests have been made by its engineering and industrial experiment station. There is no chemical reaction between it and the DDT, even when they are heated together in the presence of water vapor at 100 degrees Centigrade for several days.

Dusting powders containing insecticides are widely used to control crop pests, particularly where wet sprays are less satisfactory. The dust used must be a gritless type that is inert to the insecticide and harmless to the vegetation. Florida has large deposits of a soft variety of limestone, which when ground is easily freed from grit, and which seems especially suitable for a DDT carrier. Samples of the dust may be obtained from the station.

Science News Letter, November 3, 1945

CE FIELDS

AERONAUTICS

New Martin Transport Faster Than Prewar Liners

➤ DESIGNED for low-cost operation on continental airlines, the Glenn L. Martin Company's new commercial transport, the 202, is expected to cruise at 250 miles an hour, nearly 100 miles an hour faster than prewar twin-engined airliners.

Looking much like Martin's famed B-26 medium bomber, the 202 will be powered by two Pratt-Whitney radial engines capable of maintaining an altitude of 16,000 feet on one engine. The absolute ceiling with both engines is expected to be 30,000 feet. The low-winged, single-ruddered liner will be equipped with tricycle landing gear and reversible propellers, facilitating short takeoff distances and low landing speeds with a maximum of safety.

Servicing time will be cut down considerably by the installation of panels, opening like bomb-bay doors, to provide easy access to the radio, electrical and hydraulic systems. Particular attention has been given to passenger and crew comfort. Newly designed adjustable seats, indirect lighting and soundproofing, as well as advanced heating and ventilating systems, are expected to minimize travel fatigue.

In addition to the 30 passengers, the 202 will carry a crew of three.

Science News Letter, November 3, 1945

ORDNANCE

Anti-Aircraft Artillery Saved Antwerp From Buzz-Bombs

➤ HOW accurate and effective modern anti-aircraft artillery fire has become is disclosed for the first time in the story of how the port of Antwerp was saved from a buzz-bomb barrage, told by Capt. A. R. Dallmeyer, Jr. (*Coast Artillery Journal,* Sept.-Oct.)

A year ago, after the Allies' rush through northern France and Belgium had resulted in the capture of Antwerp without giving the Nazis time to wreck it before retreating, this port became the one great door through which supplies flowed to the armies attacking Germany on the west. Unable to attack it with bombers, the Nazis started a heavy and persistent effort to knock it out with V-1 buzz-bombs.

Defense, organized by Brig. Gen. Clare H. Armstrong, was entrusted entirely to anti-aircraft artillery, primarily American 90-millimeter and British 3.7-inch rifles. An eight-mile circle was drawn around the port, and a dense concentration of these heavy guns, together with necessary detection and fire-direction instruments, was set up to stop anything approaching it through the air. No barrage balloons or intercepting fighter planes were employed; everything depended on the guns.

Between late October 1944 and March 1945 a total of 4,883 of the Germans' flying weapons were spotted by the detectors. More than 97% of them were destroyed. Only 211 got into the eight-mile protected circle, and none of these was successful enough to hold up port traffic.

Heaviest casualties, as a matter of fact, were to the artillerymen themselves, from the explosion of crippled buzz-bombs that fell near their emplacements.

Science News Letter, November 3, 1945

BIOCHEMISTRY

Small Pores Make Good Egg Shells

➤ SCIENTISTS have found that the shell of the average hen's egg has about 8,000 pores or tiny holes in it. However, there is a great variation in the number and size of these pores. The best egg shells are the ones with a large number of small pores—so small that the escape of gases is difficult and evaporation is slow. Poor shells have fewer pores, but several large ones that make evaporation more rapid. Investigators at several experiment stations have demonstrated that these differences in shell quality are inherited.

Dr. A. L. Romanoff of the poultry department at Cornell University has made a detailed study of porosity in eggs and points out that eggs with poor quality shells lose quality much more rapidly than do those with good shells. This, he says, is particularly important at this time since greater attention is being paid to egg quality.

Workers in the U. S. Bureau of Animal Industry at Beltsville found that more broken eggs occur among those with poor shell quality. However, by using the progeny test method of breeding, they were able to improve egg shell quality considerably. Hens were selected as breeders whose eggs showed the least egg weights loss during the first 14 days of incubation.

Science News Letter, November 3, 1945

ENGINEERING

War Barbed Wire Rusts Out In Three Years or Less

➤ BARBED wire made for use in the war has been coated with only a very small weight of galvanizing. Exposure tests for farm fencing, begun by agricultural engineers at Cornell in 1936, included some samples of wires that had light coatings of galvanizing.

Test records of these wires carry a valuable lesson for farmers who are considering the purchase of surplus stocks of war fencing. After six years of exposure on a hill near Ithaca, samples carrying from 0.25 to 0.27 ounce of zinc galvanizing per square foot of wire surface were nearly completely covered with rust. At the same time, 0.28- and 0.29-ounce samples were 57% and 53% rusty, respectively, while 0.30-ounce samples were only 15% rusty, reports Prof. B. A. Jennings.

Tests were made in cooperation with the American Society for Testing Materials.

It is probable, says Prof. Jennings, that the galvanizing on barbed wire made for war use is very much lighter than the lightest on these tested samples, so it is practically certain that such surplus stock wire will be rusted completely in three years or less.

Science News Letter, November 3, 1945

AERONAUTICS

Removable Cargo Section Speeds Freight Handling

➤ AN AMERICAN of Japanese ancestry, Henry T. Nagamatsu of Cheektowaga, N. Y., has developed a principle of cargo-plane construction that promises greatly to speed the handling of air freight. U. S. patent 2,387,527, issued on his invention, has been assigned to the Curtiss-Wright Corporation.

Instead of unloading and reloading through the conventional side door, which involves holding the plane idle for a long time, Mr. Nagabatsu provides a cargo-holding section that can be detached as a whole and lowered away from the plane on a pneumatic hoist. Waiting for it in a ramped pit below is a truck-trailer unit; the cargo section simply becomes the body of the truck. When this moves off, another truck, with similar cargo section already loaded, takes its place; the section is raised into place and secured, and the plane is ready for immediate flight.

Science News Letter, November 3, 1945

ENGINEERING

Fuel Is Still Scarce

Wartime fuel conservation must continue this winter, even though the war is over. Anthracite burner saves coal by burning little at a time and burning it completely.

By A. C. MONAHAN

➤ THE WAR is over but the fuel shortage is not. For the coming winter, at least, wartime fuel conservation must continue. Production will not permit unrestricted use. There will be enough coal, oil, wood and gas to keep American homes reasonably comfortable, but prewar wasteful practices are out for the present, and should, indeed, be out forever.

Reserves of ordinary fuels, it must be remembered, are not inexhaustible. They will probably be needed for many years to heat homes and run industry's machinery. Scientists may some day develop substitutes; they may find satisfactory ways of using atomic energy or the rays of the sun, but for some years the old standby fuels will continue in use.

Many new types of fuel-saving furnaces have been developed during the war years, but few of them have as yet been widely installed. Some will use less fuel in their fire-boxes but will require electric power to operate, the electricity being generated by fuel burned elsewhere. The total saving may be small.

Among these fuel-saving furnaces is an anthracite burner that burns coal five times as fast as the ordinary furnace, but burns very little at a time and burns it completely. Electric power turns an endless screw to push the coal into a six-inch cylindrical combustion chamber and an electrically-driven blower sucks air through the burning coals.

Utilizes Every Bit

A new bituminous coal stove utilizes every bit of combustible matter in the coal, and burns up all smoke and combustible gases created in the first burning that too often go up the chimney. It operates on a unique scientific principle which combines three factors: an adequate supply of air delivered just where needed by means of fan-driven jets, a series of high-temperature refractory flues, and a path for the gases so that all combustible gases are burned up.

An efficient "whirl flame" combustion type of heater, developed for warplanes, will probably be somewhat widely used in home heating in the future. Its manufacturer is developing a version for home use. It burns a vaporized or atomized gasoline or other liquid fuel in the center of a column of whirling air. Electric power is used to introduce the whirling air column and pressure is required to force the fuel through the atomizer and spray nozzle.

These and other fuel savers will undoubtedly come into wide use in the near future, but few American homes will be so equipped to meet this winter's problem. Better methods of distributing the heat to the rooms of the home, such as the so-called radiant heating, have been developed but they, too, will not be installed early enough to save fuel this season. The furnaces, stoves and distribution of the past decade will continue in full use.

There are many reasons why fuel will not be plentiful during the coming winter. Manpower shortage is one. Many coal miners are still in the armed forces, few new miners have been trained in the past four years and many of the older men will necessarily retire. Coal mining in America is a machine job and only technically trained men are able to operate the mechanical appliances.

Oil will probably not be produced at as high a rate as during the past four years when war needs had to be met. Continuous pumping of most oil wells is not economical. Most of them need rest periods between pumpings. When the oil deep underground close to a well is pumped out, other oil seeps through the sands to replace it. Unless sufficient time is allowed for this seepage, pumps do not work at full capacity.

With the end of the war, certain heavy fuel users will no longer need supplies, it is true. But peacetime factories closed for the war will begin operating again, and many other users of fuel will need quantities far above normal.

Railroads, for instance, are facing heavy problems in meeting conversion conditions and will continue to need vast quantities of fuel. Large numbers of discharged servicemen will return to their homes, and large numbers of former war workers must be transported to new jobs. Thousands of scattered communities need raw materials so that their factories can produce civilian goods. Lumber and other building materials to repair or erect homes must be transported.

American forces in Germany will not need the large quantity of fuel required by the larger forces during the days of actual fighting but they will need American fuel. Local coal is not available in sufficient quantities for them and for the German civilian population. American occupation forces in Japan will probably require fuel from home, as that country produces little coal or oil.

Because of the disrupted condition of European coal mining resulting from the war, vast quantities of American coal are now being sent to the Netherlands, Belgium and France. The lack of mining equipment, manpower, and transportation in those countries prohibits the production of sufficient fuel to keep the homes of their impoverished people reasonably comfortable.

Gloomy Outlook

Fuel conditions may change rapidly in America, but the present outlook is none too good. Now is the time for the American householder to look forward to the coming winter and its heating problems. This means putting the heating plant in first-class order and the house in condition to retain the heat. It means also learning efficiency in firing a furnace or stove.

The heating plant includes not only the furnace but the smoke pipe and chimney. All three must be clean if good results are to be obtained. If a professional is not available to clean them with modern equipment, including a vacuum cleaner, the householder can do it himself.

To clean the furnace a wire brush and a scraper are needed. All surfaces must be cleared of soot so the metal is clean. The brush and scraper can be used to clean the smoke pipe. The chimney is cleaned with a brick wrapped in rags, and raised and lowered on the end of a stout cord from a position on the roof.

When the surfaces are clean all soot and other materials should be removed from the ashpit, and grates and dampers inspected. If the smoke pipe is burned through a new one should be obtained.

With low-volatile bituminous coal, the conical method of firing is recommended.

GETS MORE HEAT—With the "down-draft burner," being placed into the firing door of a furnace by Prof. Julian R. Fellows of the University of Illinois, soft coal can be burned without smoke, thus getting more heat from the fuel.

The coal is carefully piled in a cone in the center of the fire-box. The larger pieces roll to the walls of the firebox where the air will flow freely through them and make a hot ring of flame next to the heating surface. The finer pieces remain in the center and give off gases that are lighted by the flame from the larger outer pieces.

When high-volatile bituminous is used, the V method of piling is recommended. This means heaping the coal in a sloping pile on one side of the fire-box. This leaves red coals on one side and fresh coal on the other. The top of the fresh coal is quickly lighted by the flame from the other and the gases coming from it are consumed as they pass through the burning layer. On the next firing the fresh coal is put on the opposite side.

Burns Evenly

When burning anthracite in the shovel-feed furnace, the top surface of the coal is kept about on a level with the bottom of the feed door. It burns evenly throughout. Care should be taken not to shake the grates too much. Some ashes should be left on them or the hot coals may warp or burn them. Enough of the ashes must be shaken out to permit air to pass to the burning coals above, otherwise complete combustion will not take place.

The principal loss of heat from a poorly constructed house is through crevices around windows and doors, or under the eaves, through the glass in the window panes or through spaces between window sashes and frames.

Stuffing the crevices with rags or with some of the commercially available special materials will stop most of the losses through them. Storm windows prevent leakage through the glass itself. Weather stripping on windows and doors closes the spaces between them and their frames.

Science News Letter, November 3, 1945

AERONAUTICS

Restricted Data by NACA To Be Released Now

➤ WITHHELD from the public by wartime restrictions, over 300 technical reports and notes on aerodynamics, aircraft structures, power plants and general scientific operation problems will soon be released to technical libraries, schools and to the aircraft industry by the National Advisory Committee for Aeronautics.

The announcement of declassification of these reports was made by Dr. G. W. Lewis, director of aeronautical research of NACA. Covering every problem encountered by aeronautical engineers, these data will be of great value to aeronautical engineering students as well as to manufacturers. The data were compiled at the NACA laboratories at Langley Field, Va., and its newly announced supersonic research laboratory in Cleveland.

Science News Letter, November 3, 1945

ASTRONOMY

Scientists on Trail Of Brilliant Fireball

➤ SCIENTISTS are on the trail of a fireball momentarily of full moon brilliance that flashed across middle eastern United States at about 3 a.m. on the morning of Oct. 21.

Fragmentary reports have been received from the New York and Philadelphia area by Dr. Charles P. Olivier of the Flower Observatory, Upper Darby, Pa., who is president of the American Meteor Society.

This visitor from outer space plunging into the earth's atmosphere was accompanied by bluish flashes as seen by some observers. Those who saw this meteor are asked by Dr. Olivier to send in reports to aid in location of its path and where it exploded.

Science News Letter, November 3, 1945

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Do You Know?

Bacteria may attack nearly all kinds of petroleum products, including waxes, oils, kerosene and gasoline, if they are stored in the presence of water.

The common *chipmunk* carries the nuts he gathers in his cheek pouches and has been known to carry four hickory nuts at a time.

One-fourth of the total area under cultivation in the world is devoted to growing *wheat,* and the annual harvest is approximately 140,000,000 tons.

A water-repellent, insulating *liquid,* recently developed, when sprayed on spark plugs and wiring in automobiles protects the engine from moisture even when buckets of water are thrown on it.

Fresh *milk,* frozen with extreme rapidiy at 20 degrees below zero Fahrenheit, may be kept months, and when thawed out is as appetizing and tasty as it was in its original condition.

A new form of *hormone spray* containing naphthalene acetic acid in emulsifiable oil, applied to orchard trees from an airplane, reduces the pre-harvest drop of apples and pears caused by winds.

Future buildings may, in numbers far exceeding present structures be windowless and lighted entirely by artificial light, or be constructed with side walls and doors of glass and with mirrors for inside walls and ceilings.

Turkey eggs for eating may soon join the familiar chicken eggs on the market as a result of the development of a small-sized turkey which is a heavy layer and produces eggs throughout most of the year.

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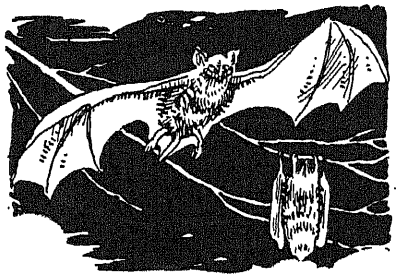
ZOOLOGY

NATURE RAMBLINGS

by Frank Thone



Proximity Sensings

➤ BATS were the original discoverers of the principle of the proximity fuze.

These flying mammals have long excited man's wonder at their ability to fly about in the near-darkness of caves, or outdoors in the deepening dusk, without ever colliding with the walls or with each other. Small wonder that our ancestors were inclined to look upon them as endowed with darkly supernatural powers —even to the extent of picturing Satan as having bat's wings!

Modern scientists, insatiably curious and unafraid of the Devil himself, have done some rather extensive experimenting on this uncanny ability of bats to sense their way around in the dark. They have tried putting up obstacles that must be as difficult for bats to see as for human beings, things like stretched wires and suspended strings—and the bats would avoid these as readily as they did larger and more obvious lumps of matter.

Finally the secret was hit upon. Bats, it was discovered, constantly give out exceedingly shrill little chirpings while in flight. Probably the chirps that we hear are the lowest-pitched of the bat's tones, at that—higher notes that they pipe are above the human ear's perceptive ability. Echoes of these high-pitched notes, returned to the bat's ears by the surfaces of obstacles, warn of impending collisions, and the bat's exquisitely-balanced neuromuscular flight controls automatically go into action and cause a saving zoom or swerve.

Now this is essentially what the proximity fuze does, except that in its case the echo-producing vibrations are those of ultra-short radio waves in the ether instead of ultra-short sound waves in the air. But the principle is the same—an apparatus that sends out exploratory vibrations and catches their returning echoes. Of course, the resultant behavior is different: the bat swerves, the bomb blows up. But that is a mere matter of detail.

The analogy promises to become closer, now that the war is over and men are looking for peacetime applications for war-born devices. It is proposed to equip airplanes with adaptations of the proximity fuze, with suitable electronic relays to bring about an automatic avoiding maneuver when the plane approaches an unseen obstacle in darkness or fog.

If this comes to pass, it will be a curious closing of a cycle. When what we now know as radar was first invented, it was called an "absolute altimeter": the echoes of short radio waves sent out from a plane were to warn of the proximity of dangerous obstacles like jutting mountain-tops, and enable the pilot to avoid them. Now it is proposed to make the avoidance independent of human eyes on the instrument board and hands on the controls—to turn the plane into a kind of mechanical super-bat.

Science News Letter, November 3, 1945

AERONAUTICS

Entire Airplane Consists Of One Thick Wing

➤ WHAT LOOKS like the ultimate development in the "flying wing" type of aircraft is offered for patent 2,384,893 by Prof. Louis H. Crook, aerodynamics specialist on the physics faculty of the Catholic University of America. The entire craft consists of one thick wing, with control surfaces at its trailing edge and its outer ends. Everything else is inside the wing, even the propellers. Two are mounted; one at the wide mouth of a tunnel that tapers to a choke near the center of the wing, the other at the choke, just before the tunnel widens again toward the outlet.

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Root *vegetables* should be stored in closed containers and at a temperature at least as low as 40 degrees Fahrenheit.

Apple trees have *"measles"* but not the kind the human race experiences; diseased trees have irregular, dead, brown-colored pockets of tissues scattered throughout the interior of the bark.

Formaldehyde, at the rate of a million pounds a month, will be produced at a new plant at Springfield, Ore.; it is an essential chemical in the production of synthetic resins and plastics.

ORTHOPEDICS

Better Artificial Limbs

Will be the result of research now in progress under the direction of a committee of the National Research Council. Perfect substitutes too much to expect.

➤ BETTER artificial arms and legs for veterans and civilians can be expected as a result of research now under way in the services and under the direction of a committee of the National Research Council. This much became clear as a Congressional committee on aid to the physically handicapped, under the chairmanship of Rep. Augustine B. Kelley of Pennsylvania, opened hearings.

Veterans or their friends who expect the perfect or ideal in the way of an artificial hand, leg, arm or foot, however, will probably be disappointed.

"Even the best conceivable artificial arm or leg can be but an inadequate substitute for the member it replaces," Dr. Paul E. Klopsteg of Northwestern University, chairman of the National Research Council's committee on prosthetic devices, has already pointed out.

Even after full recovery from an amputation, the muscles are shrunken and have much less power and force than those of the original arm or leg, Dr. Klopsteg explained. His committee is studying devices for supplying external power, including mechanical, electrical, hydraulic and pneumatic.

Army research on the problem of artificial limbs is going forward at its amputation centers. In these, the program coordinates the work of the surgeons and physiotherapists who prepare the stump, the work of the men who fit the devices, of those who train amputees to use the devices, and the development and standardization of the artificial arms and legs and hands.

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The Army has about 14,000 major amputation casualties. These include cases ranging from loss of all fingers of one hand or half of one foot to the loss of both arms above the elbow. This last is one of the most serious of all. Fortunately it is a rare occurrence. Only four Army veterans have this disability.

Standardization of parts is one of the projects the Army has been working on, in cooperation with the National Bureau of Standards and artificial limb manufacturers. This has already been accomplished for the foot and ankle and it is hoped standards for knees will be completed shortly.

Setting standards for the best possible knee, ankle or other part was somewhat handicapped in Army centers by the fact that, naturally enough, every time a new device was being tried, all the amputees wanted to try it. This made scientific comparisons difficult. Making changes was also difficult, with as many as 1,600 amputees in Army hospitals at one time. One hospital had 400 amputation patients in one month.

The biggest difficulty seems to be with artificial hands.

"You cannot replace the normal hand," Col. Leonard P. Peterson, of the Surgeon General's Office in the War Department stated.

At the same time he said that the present artificial hand is not as good as it should be. One difficulty in constructing hands is that the more that is put in for improving appearance and increasing the usefulness of the hand, the heavier it becomes. The higher the amputation, the less likely the amputee is to wear an artificial hand and arm and the less likely he is to get good out of one.

Legs can be made to approach the normal leg much more closely. The Army is now fitting metal legs at one center, plastic ones at another and fiber ones at five centers. Study of the results will perhaps show which is best, although there may always be individual variations in the needs of different amputees.

Even with a good artificial leg, best results will not be obtained unless the wearer learns how to use it, and the same of course is true of hands and arms. This and the proper treatment of the stump are two points on which veterans may have the edge over civilian amputees, since the Army gives much attention to both points.

Search for the best ways of "bonding" parts of the prothesis, for example the calf to the ankle joint, is also under way at Army centers.

While many veterans and their friends may be dissatisfied with the artificial arms and legs now being supplied by the Army, Col. Petersen pointed out that the Army only has the problem during war and that amputees only started coming in a year and a half ago.

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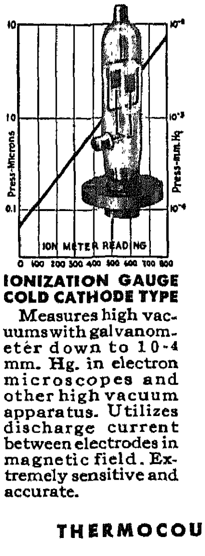
Most *cabbage* seed used in the United States is obtained from plants grown on the Pacific coast because that area is better suited for cabbage seed production.

Tropical *cyclones* on the Gulf and Atlantic coasts are called hurricanes; in the South Pacific and the Indian ocean, cyclones; in the Philippine-Japan region, typhoons, and on the northwestern Australian coast, willy-willies.

HIGH VACUUM GAUGES



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PUBLIC HEALTH

Health Campaign

Men and women by the thousands are voluntarily lining up at health centers in Savannah, Ga., to be tested for TB and venereal diseases.

➤ THOUSANDS of men and women from every walk in life are lining up at health centers in Savannah, Ga., to wait their turn for chest X-rays and blood tests as that city wages a 45-day campaign against tuberculosis and venereal disease.

The campaign, scheduled to run from Oct. 15 to Nov 30, is breaking records for disease fighting. It is the first time in public health history that syphilis and tuberculosis have been combined in case-finding. And while Birmingham, Ala., pioneered last spring in a mass attack on syphilis and gonorrhea, the campaign there resulted from a state law requiring blood tests, and treatment where needed, for all persons between the ages of 14 and 50 years.

Savannah citizens are showing that no law is needed to make people take these important steps for protecting their own and their community's health. The campaign here is on a voluntary basis. Yet in the first four days of the campaign 5,719 chests have been X-rayed to detect tuberculosis and 5,719 blood samples have been taken to test for syphilis.

The blood testing laboratory, set up to run 1,000 tests a day, has already had to be reorganized and enlarged to handle more than twice that number daily.

At one center, on the third evening of the campaign, men and women stood in line for three hours, waiting of their own accord for the rushed staff of doctors and nurses to get the X-ray pictures made and the blood samples taken.

"TB can be cured in its early stages. An X-ray today may save your life tomorrow."

When you read that message on eight-foot high posters on the main business streets of your town, see it repeated in street car cards and in the newspaper and hear it over the radio, you take action, it appears from the overwhelming response here. Whether you are a member of the women's auxiliary of the state medical society or a Negro laborer living in a public housing project, you follow the directions on the poster and go to the health center or your physician.

Here, as in Birmingham last spring, the streets and cars are also placarded with the notice that treatment of syphilis with penicillin can be completed in nine days and that blood tests will be given at the health center.

Syphilis patients go to the U. S. Public Health Service's rapid treatment hospital. Tuberculosis patients go to another hospital for the rest and other measures that are part of the treatment of this disease.

Examination and penicillin treatment for gonorrhea is also being given but is not the featured part of the campaign.

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● Just Off the Press ●

CALABASHES AND KINGS: An Introduction to Hawaii—Stanley D. Porteus—*Pacific Books*, 245 p., illus., $3.50.

CLASSIC DESCRIPTIONS OF DISEASE, With Biographical Sketches of the Authors—Ralph H. Major—*C. C. Thomas*, 667 p., illus., $6.50. Third ed., revised and enlarged.

FROM PEARL HARBOR INTO TOKYO: The Story as Told by War Correspondents on the Air—Paul Hollister and Robert Strunsky, eds.—*Columbia Broadcasting System*, paper, 312 p., illus., 25 cents.

MY TWENTY-FIVE YEARS IN CHINA—John B. Powell—*Macmillan*, 436 p., $3.50. A newspaper correspondent's experience, covering the years 1917 through 1942.

MODERN MAN IS OBSOLETE—Norman Cousins—*Viking*, 59 p., $1. A discussion of the problems raised by the birth of the Atomic Age.

THE MANAGEMENT OF THE MIND—Milton Harrington—*Philosophical Lib.*, 200 p., $3. Edited from posthumous manuscripts and notes by Ralph B. Winn.

PSYCHIATRY IN MODERN WARFARE—Edward A. Strecker and Kenneth E. Appel—*Macmillan*, 88 p., $1.50.

OUT OF CARNAGE—Alexander R. Griffin—*Howell, Soskin*, 327 p., $3. A description of technical and medical discoveries made under the stress of war.

TABLE OF ARCSINX—Lyman J. Briggs, Arnold N. Lowan and others—*Columbia Univ. Press*, 121 p., $3.50. Prepared by the Mathematical Tables Project under the sponsorship of the National Bureau of Standards.

THE SOCIAL IMPACT OF SCIENCE. A Select Bibliography, With a Section on Atomic Power—*Supt. of Doc.*, paper, 51 p., 15 cents. Prepared by the Library of Congress for the Subcommittee on War Mobilization of the Committee on Military Affairs, U. S. Senate.

A TRIP THROUGH THE NEW BUILDING OF MELLON INSTITUTE—*Mellon Institute of Industrial Research*, 20 p., paper, illus., free. Third ed.

Science News Letter, November 3, 1945

Photo courtesy H-B Instrument Co.

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Every Library Should Have a Copy

• Books of the Week •

➤ MANY PERSONS who would be little interested in the names of wildflowers become acutely interested in the identity of the unsown—and usually unwanted—plants that spring up in numbers on the lawn or in the vegetable garden. A flora of these hardy though unwelcome volunteers is offered by John M. Fogg, Jr., in WEEDS OF LAWN AND GARDEN (*Univ. of Penna. Press,* $2.50). Well-drawn, generous-sized line illustrations make identification easy, and brief, informal text descriptions give an idea of the habits of the plants and sometimes suggestions on what to do about them.

Science News Letter, November 3, 1945

➤ EVEN BEFORE the bursting atom had produced a military revolution and threatened a political one, it was playing hob with philosophies invented in times when atoms were really atomic, that is, indivisible. The new physics is producing a new metaphysics. The old, safe, clockwork cosmos of nineteenth-century materialism has to give way to something newer which, if less certainly predictable and dogmatically definable, is at least a closer approach to truth. In AFTER MATERIALISM—WHAT?, Sir Richard Clifford Tute tries his hand at some of the answers. (*Dutton,* $3.)

Science News Letter, November 3, 1945

➤ SCIENTISTS who can conduct research and also write interestingly are rare; more rarely still do they come in pairs. One such dually-gifted team is Carroll Lane Fenton and Mildred Adams Fenton. They have done much creditable field work in geology; now, in THE STORY OF THE GREAT GEOLOGISTS, they trace the steady evolution of their science through life sketches of the men who found the facts and argued out the theories. (*Doubleday, Doran,* $3.50.)

Science News Letter, November 3, 1945

➤ BRIEFER than most college texts in botany, L. Edwin Yocum's PLANT GROWTH nevertheless covers essential points adequately. Its primary emphasis on function rather than form is especially to be commended. (*Cattell,* $3.)

Science News Letter, November 3, 1945

➤ NEWEST ADDITION to the Pacific World Series is PLANT LIFE OF THE PACIFIC WORLD, by Elmer D. Merrill (*Macmillan,* $3.50). Of course, a one-book presentation cannot do more than outline the enormous, complex and diversified botany of this great area; but it has the merit of meeting an immediate need, and it is hoped will help to stimulate collections and note-taking that will eventually synthesize into the complete Botany of the Pacific Area.

Science News Letter, November 3, 1945

➤ ONE of the best known of living paleontologists, Roy Chapman Andrews, presents in MEET YOUR ANCESTORS a compact popular account of present knowledge of ancient man and his possible ancestry. This book is especially valuable for its inclusion of recent discoveries, particularly in this country. (*Viking,* $3.)

Science News Letter, November 3, 1945

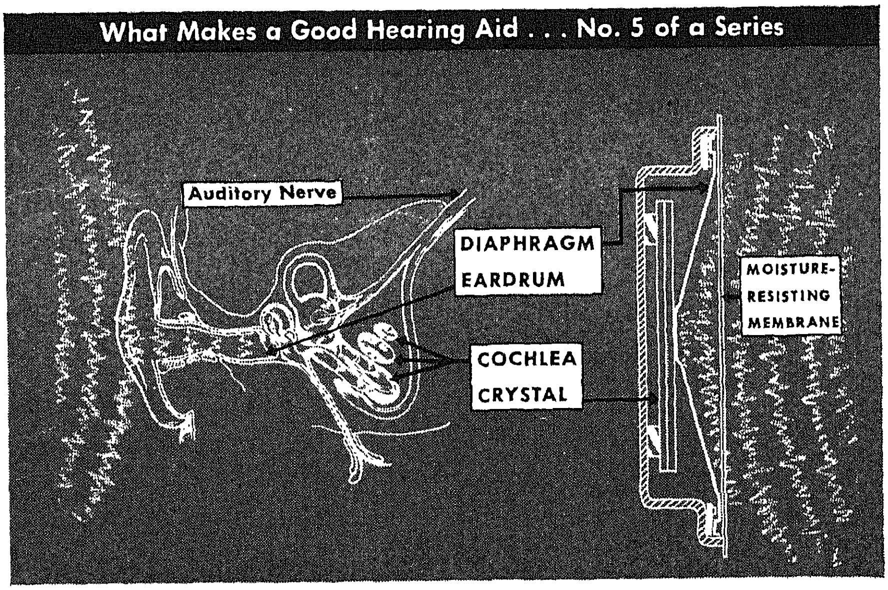
➤ LITERATURE on Southeast Asia is growing in proportion to popular interest in this area, recently one of the many scenes of war. However, the timeliness of H. G. Deignan's new monograph, THE BIRDS OF NORTHERN THAILAND, is largely a coincidence, for the book was in preparation long before the war. Ornithologists will feel indebted to the Smithsonian Institution for producing this excellent publication. (*Supt. Publ. Documents,* $1.25.)

Science News Letter, November 3, 1945

➤ ANILIN'S myriad rainbow-tinted derivatives so dominate the world's dye-vats that it is difficult for us to realize that they are all creations of yesterday, that our grandparents knew fabrics colored with extracts of roots, barks and berries. Douglas Leechman, in his little book, VEGETABLE DYES FROM NORTH AMERICAN PLANTS, recaptures some of this all-but-lost lore of colors and puts it into forms that the least experienced amateur can readily use. It should be appreciated especially by persons interested in handcrafts. (*Webb,* $1.25.)

Science News Letter, November 3, 1945

A strain of *bees* resistant to American foulbrood, one of the worst bee diseases, is being produced through breeding and selection with promising results by the U. S. Department of Agriculture.



What Makes a Good Hearing Aid . . . No. 5 of a Series

MICROPHONE

• The crystal microphone should be considered as the "ear" of a hearing aid.

The diaphragm of the microphone—an "eardrum" that vibrates to sound waves—should pick up sound from all directions. The microphone should be mounted on shock absorbent material in such a way as to protect the diaphragm from mechanical and frictional noises.

Sound energy is converted into electrical energy, which is comparable to cochlear nerve impulses, by means of a Rochelle Salt Crystal which possesses the piezo-electrical property of responding to sound frequencies transmitted by the diaphragm. These delicate crystalline "nerves" should be sealed into the microphone to protect them from moisture.

Good hearing aid performance depends upon the engineering and precision manufacture of its miniature microphone—its sensitive electro-mechanical "ear."

To design the microphone for the new WESTERN ELECTRIC Model 63 Hearing Aid, Bell Telephone Laboratories drew on its vast experience in telephony, radio, movie and public address sound systems.

THIS SERIES, BASED UPON RESEARCH CONDUCTED BY BELL TELEPHONE LABORATORIES IS PUBLISHED IN THE INTEREST OF THE HARD OF HEARING AND THEIR PHYSICIANS

Western Electric Hearing Aids

MADE TO BELL TELEPHONE STANDARDS

• New Machines and Gadgets •

⚙ *BRUSH without bristles, recently patented, for use as a cloth or scrubbing brush, has a series of spirally-rolled pieces of rubber in place of the usual bundles of bristles.*

Science News Letter, November 3, 1945

⚙ *BATTLESHIP TOY has a deck crowded with toy soldiers, guns and other shiplike articles that are scattered widely when a spring of a mousetrap-type hits the under side of the deck. The spring is released only if a small bomb, dropped by hand, hits the broadened top of a pin that extends through the deck.*

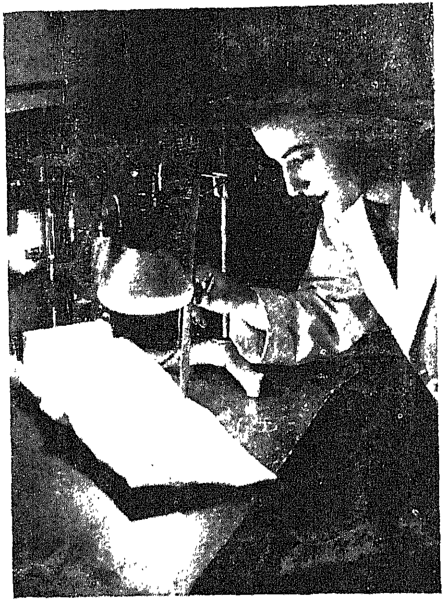
Science News Letter, November 3, 1945

⚙ *COMBINATION goggles and eyeshades are made of flexible tinted plastic material. The transparent protective goggles fit over the eyes, extending down each side of the nose and back over the temples. The semi-transparent eyeshade is hinged to the goggles.*

Science News Letter, November 3, 1945

⚙ *PRUNING TOOL, operated hydraulically, has a fixed blade, and a movable blade operated by fluid pressure. Flexible hose connects the pruning head with a pressure tank carried by the operator, the pressure being by foot-action.*

Science News Letter, November 3, 1945



⚙ *SCORCH from a flatiron can be removed from shirts and dresses in only 10 minutes with a special lamp that radiates long-wave ultraviolet rays instead of using sunlight, which requires many hours of exposure. The scorched area of the shirt shown in the picture is dampened slightly before the ultraviolet rays are applied.*

Science News Letter, November 3, 1945

⚙ *TO CONVERT alternating to direct current for battery charging and many other purposes, selenium rectifiers are now made with aluminum in place of iron or similar metals to give lightness. A method of sealing the units hermetically permits their use in any climate.*

Science News Letter, November 3, 1945

⚙ *MECHANICAL LEVER, a device using a pendulum free to swing in any direction instead of a liquid in a tube, is housed in a flat-bottomed box with a transparent hemisphere for a cover. Above the ball-suspension of the pendulum, an upward-extending pointer shows the levelness on the graduated cover.*

Science News Letter, November 3, 1945

⚙ *BURIAL URN, to hold the ashes of a cremated body, is made of a ferrous sheet metal with a heavy coating of corrosion-resistant porcelain. The opening is in the center of its inverted cup-shaped base and can be properly sealed.*

Science News Letter, November 3, 1945

If you want more information on the new things described here, send a three-cent stamp to Science News Letter, *1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 283.*

Question Box

AERONAUTICS

What transport is capable of cruising speeds of 250 miles an hour? p. 281.

BOTANY

How badly were the botanical collections in Java damaged by the Japs? p. 280.

CHEMISTRY

How is the war-developed shark-repellent helping fishermen? p. 277.

What action other than germ-killing does penicillin possess? p. 280.

ELECTRONICS

What is the power of the X-rays given off by the new betatron? p. 278.

ENGINEERING

How long does war-made barbed wire last? p. 281.

MARINE BIOLOGY

How good is DDT for all ship-fouling organisms? p. 268.

MEDICINE

What is the new anemia remedy? p. 279.

What is the new athlete's foot remedy? p. 274.

PHYSICS

What is the only way we can derive peaceful applications from atomic energy? p. 274.

PUBLIC HEALTH

What city is staging a volunteer health campaign? p. 286.

RADIO

What is "loran"? p. 275.

ZOOLOGY

How fast can a kangaroo hop? p. 280.

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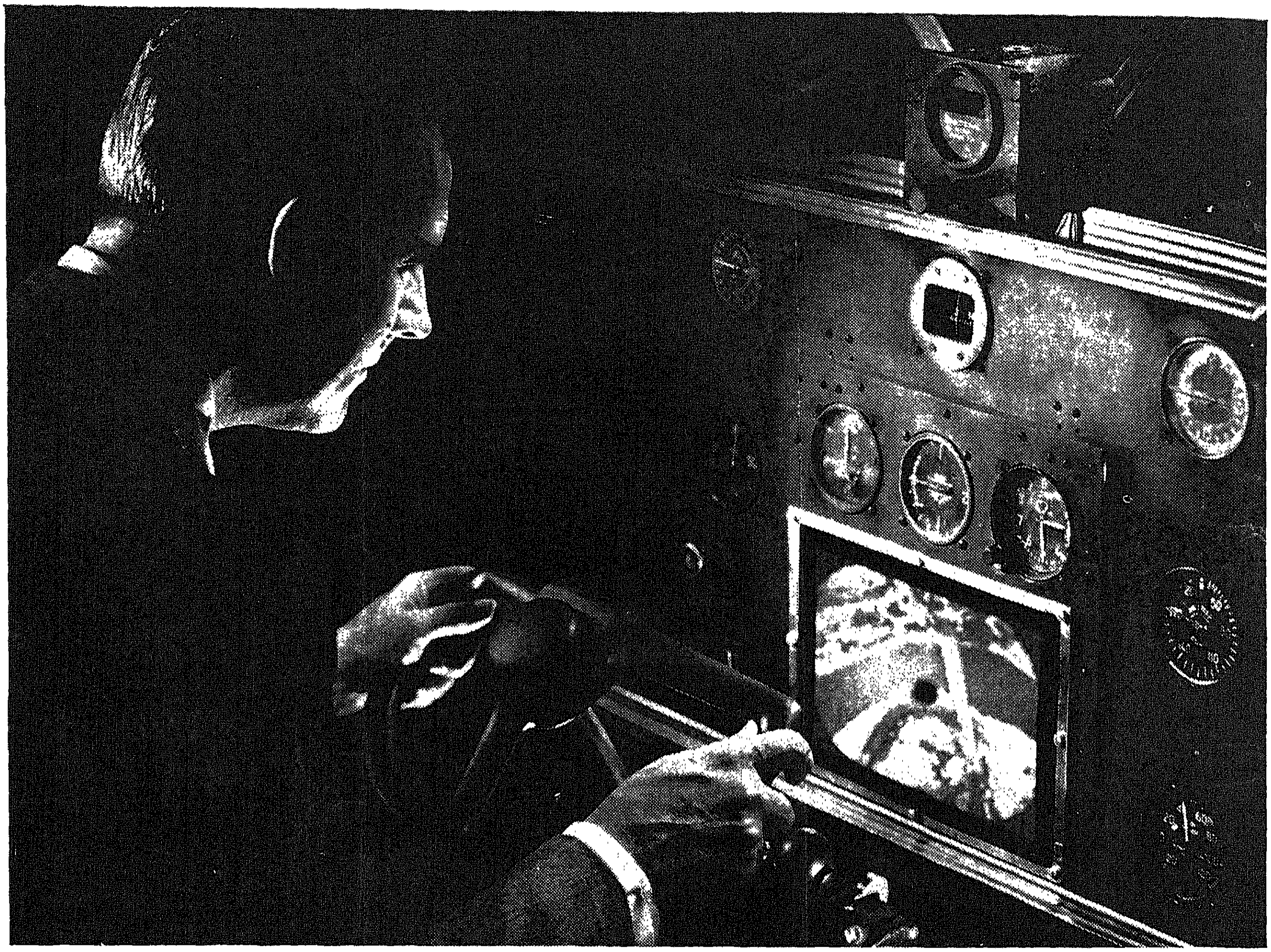
IENCE NEWS LETTER

E WEEKLY SUMMARY OF CURRENT SCIENCE • NOVEMBER 10, 1945

Problem Solver

See Page 291

A SCIENCE SERVICE PUBLICATION



One of the many ways radar can serve aviation is by enabling the pilot to "see" through fog and darkness.

Radar – a "Moving Roadmap" for Flying

Pilots can now have an accurate radar "road map" of the earth below—showing landmarks and major details of terrain. Radar will make it a whole lot safer to fly at night or in stormy weather—as well as in broad daylight.

This is only one of the many possible uses for radar. For example, radar will "see" icebergs or islands many miles away—day or night—and enable ships to avoid them. It will provide man with an amazing new "sixth sense"—and will be used in a great many ways yet to be discovered.

RCA research and engineering played a leading role in developing radar. Similar research goes into *all* RCA products.

And when you buy an RCA Victor radio or television set or Victrola, made exclusively by RCA Victor, you enjoy a unique pride of ownership. For you know, if it's an RCA it is one of the finest instruments of its kind that science has achieved.

Radio Corporation of America, Radio City, New York 20. *Listen to The RCA Show, Sundays, at 4:30 P.M., Eastern Time, over the NBC Network.*

HOW RADAR WAS BORN

During RCA experiments at Sandy Hook in the early 1930's, a radio beam was shot out to sea. Men listening with earphones discovered that this beam produced a tone upon hitting a ship that was coming into the New York harbor.

Later on the question arose, "If radar could 'hear' couldn't it be made to 'see'?" So the viewing screen—or scope—was incorporated into radar. This scope is an outgrowth of the all-electronic television system that was invented and perfected at RCA Laboratories.

RADIO CORPORATION of AMERICA

ENGINEERING-MATHEMATICS

Mathematical Machine

New mathematics of future engineering expected from mechanical brain now released from war work; works on non-linear problems.

See Front Cover

➤ THE mathematics that the engineers of the future are likely to use is expected to come out of the research to be done with the new electronic differential analyzer of the Massachusetts Institute of Technology which has been released from war to peacetime work. The machine is shown on the cover of this SCIENCE NEWS LETTER.

This new mathematical robot, with 2,000 electronic tubes, several thousand relays, 150 motors and nearly 200 miles of wire in its mechanical "brain", has worked on the development of radar theory, computing range tables for the U. S. Navy guns and other war tasks.

Now it is to be used on an equally important job. It is free to turn to the task for which it was designed—creating the groundwork for the mathematics of the future.

The mathematics currently used in physics and engineering applications has been devoted to the solution of what mathematicians call "linear" problems, but it has become increasingly evident that the usefulness of these methods has been almost exhausted. They will still constitute the major body of information in handling routine problems.

But the new problems in physics, electrical engineering, aerodynamics, and similar fields seem to be primarily non-linear. Leading mathematicians admit that their principal handicap in handling such problems is that they just don't know enough about the nature of solutions to these problems to make intelligent guesses as to what they are like. From the mathematician's point of view, the major contribution of the differential analyzer and similar computing machines will be to provide the "horse-work" to build up an immense number of detailed numerical solutions to non-linear problems so that the form or shape of the general solutions will become intuitively familiar.

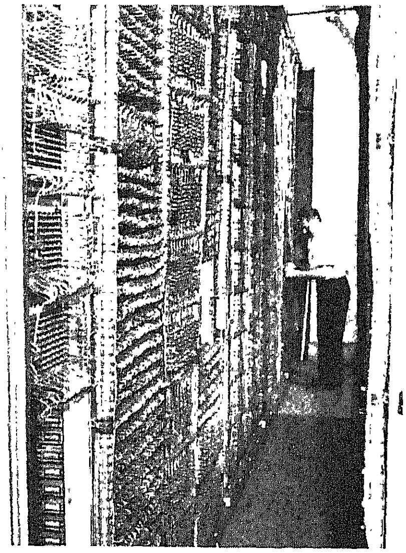
To solve new problems, a mathematician must develop a feel for what the solution will be like. The computing machines of the future must provide a skeleton outline of the new mathematics as a framework for the mathematician to construct theories which the physicist and the engineer require.

Scientific announcement of the differential analyzer has just been made in the Journal of the Franklin Institute in a joint paper by Dr. Vannevar Bush, formerly vice-president of the Massachusetts Institute of Technology, and now president of the Carnegie Institution of Washington and director of the Office of Scientific Research and Development, and Dr. Samuel H. Caldwell, director of the Institute's Center of Analysis.

The original differential analyzer, designed by Dr. Bush and his associates and built in 1931, was entirely a mechanical machine, and the solution of problems required manual setting of gears and other connections. In the new machine these settings and connections are automatically accomplished by electrical "couplings," an instantaneous process controlled by punched paper tapes. For ordinary operations the huge machine requires only one operator. The symbols of the mathematician representing the problems for which a solution is desired are translated into a "language" which the machine understands. This "language," a code punched on a paper tape, is transmitted to the machine which automatically selects the various units required for the process of computation.

Unlike conventional types of calculating machines which operate on numbers, the new differential analyzer deals with problems involving rates of change among variable quantities. The solution of a differential equation is not just a number; it is a numerical history of the concurrent instantaneous values of two or more variables. These solutions may be produced either graphically or numerically, or in both forms. A graphical solution consists of a curve drawn automatically by the machine, showing the relation between any two variables appearing in the differential equation. A numerical solution consists of a printed table of the corresponding values of the variables at any convenient intervals.

Science News Letter, November 10, 1945



LOTS OF WIRE!—A behind the scene view of the complex wiring in the new electro-mechanical differential analyzer. The machine contains 200 miles of wire, 2,000 electronic tubes, several thousand relays, and about 150 motors.

ELECTRONICS

Television in Full Color Will Soon Be on the Air

➤ TELEVISION pictures in full color will soon be on the air from a new installation in the Chrysler building in New York. It will be an experimental color television transmitter station to conduct propagation tests both local and long-distance. The installation follows the relatively recent successful sending of pictures in full color, not only within a laboratory, but from one building here to another several blocks away where they were received with full clarity.

Full color television employs radio waves of the new ultra high frequencies, according to Paul W. Kesten, executive vice-president of the Columbia Broadcasting System, who was probably the first to announce the successful transmission of television in color through the air. "Transmitting power of less than 1/10 the present power requirements of low frequency television transmitters," Dr. Peter C. Goldmark, television engineer of the same company, declares, will satisfactorily cover an area like New York.

Describing the color-television tests recently before the Federal Communications Commission in Washington, Dr. Goldmark pointed out that by means of an inexpensive directional antenna and the use of the high-frequency television bands, "ghost free" reception was possible for the first time in the history of television. "Ghosts" in television are similar to echoes in radio and appear as shadows on the television screen.

The manufacture of receiving and transmission equipment for color television is already in progress. The General Electric Company has taken the CBS receiver developments and will turn them into commercial products. The first are scheduled to be completed by the end of January, 1946. The studio equipment developed by CBS technicians is now being manufactured by the Westinghouse Electric Corporation.

Science News Letter, November 10, 1945

ELECTRONICS

Located Nazi Submarines

➤ THE STORY of the development of sono-radio buoys, that located Nazi submarines under the waters of the Atlantic and guided Allied destroyers to the spot for the kill, can now be told.

Visual and radar sighting served well as long as the enemy U-boats stayed on the surface but were of no value when the subs remained under water. The sono-radio buoy gave the airplane ears to hear, locate, and to follow a submerged U-boat.

The warned airplane could itself attack or call destroyers to the spot.

By relaying subsurface noises to the plane, the sono-radio buoy also made it possible to know the outcome of the attack. Sometimes the propeller beat of the U-boat as it fled the scene could be heard. Sometimes ominous break-up noises followed by silence testified to the death of the sub.

The sono-radio buoy, according to Dr. John T. Tate of the National Defense Research Committee, was a development of Division 6 of that committee, carried out under contract with Columbia University, Division of War Research, at the U. S. Navy Underwater Sound Laboratory at New London, Conn.

"The sono-radio buoy," Dr. Tate states, "was not a flash of genius springing from the brow of an inventor. Rather it was one of the results of purposefully bringing a group of trusted scientists and engineers into intimate and continuing contact with the progress and problems of U-boat warfare as it developed in the Atlantic."

The idea of the sono-radio buoy was not new, he said, but was taken from a heavy moored type of buoy, developed by the Naval Research Laboratory, for use in harbor protection where cable-connected hydrophones were not practical. But the adaptation to use a device of this sort from airplanes in U-boat warfare was new.

The problem was to develop a sono-radio buoy light enough to be carried in quantities by airplanes, cheap enough to be expendable, and rugged enough to withstand the shock of water entry. In addition it had to have battery-power sufficient for several hours' life, and adequate acoustic and radio range.

The floating sono-radio buoy picks up the sounds of a submerged U-boat by hydrophones which change the sound waves in the water into small electrical voltages which are amplified and converted into radio waves in the transmitter part of the buoy. Airplanes carried receivers tuned to the same frequency of the buoy transmitters.

Operators easily learned to distinguish between natural underwater sounds and foreign underwater noises. After locating an underwater craft and flashing word back to the destroyer base, the plane hovered over the spot and, by dropping additional buoys, followed the U-boat along its course.

Science News Letter, November 10, 1945

CHEMISTRY

More Efficient Method For Extracting Magnesium

➤ MORE efficient, hence cheaper, extraction of magnesium from sea water is promised through a newly patented method developed by two chemists employed by the Dow Chemical Company at Midland, Mich., Dr. John J. Grebe and Dr. William C. Bauman. They have assigned to their employing corporation rights in their patent, No. 2,387,898.

Although the application is new, the principle involved has been used for a long time in water-softening systems, in which the undesired minerals are seized and held fast by what is known as a base exchange agent, such as sodium aluminum silicate. Such a base exchange agent is used in the Grebe-Bauman method for extracting the magnesium from the sea water. When the concentration in the base exchange bed has become high enough, the magnesium is dislodged by passing through what is essentially concentrated sea water—a 15% solution of sodium chloride. Partial evaporation of this brings down the common salt in solid crystals; the magnesium chloride flows out, still in solution, and may then be finally evaporated down and the magnesium extracted electrolytically.

Science News Letter, November 10, 1945

Copper sulfate is used to dull or deepen the shade of dyed leather.

SCIENCE NEWS LETTER

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MEDICINE

Helps High Blood Pressure

Some patients are helped by a rigid salt-free diet. Must cook everything, including bread, at home and milk must be treated to remove sodium.

➤ NEW ANGLES on high blood pressure appear in two reports in the *Journal of the American Medical Association,* (Nov. 3).

A salt-free diet treatment will help some patients, Dr. Arthur Grollman and collaborators of the Southwestern Medical College report on the basis of animal studies and trials in patients.

This type of diet treatment was tried many years ago and abandoned when it failed to give good results. One reason for the failure, Dr. Grollman believes, was that the diet was not really free of salt, or rather, of sodium. It is the sodium part of salt, not the chloride, that Dr. Grollman finds important in high blood pressure control. To eliminate enough of this from the diet means patients must cook everything, including bread, at home and if they drink milk, that must be treated to remove the sodium. Not all patients, however, are helped by this diet, which also accounts in part for the failure of dietary control to attain general recognition.

Associated with Dr. Grollman in the studies were: Dr. T. R. Harrison, Dr. M. F. Mason, Dr. James Baxter, Dr. Joseph Crampton and Dr. Francis Reichsman.

The importance of the cortex, or outer part, of the adrenal gland for the development or maintenance of essential hypertension, one kind of high blood pressure, is suggested by Dr. George A. Perera, of Columbia University College of Physicians and Surgeons.

This suggestion is based on experience with a patient who had high blood pressure and subsequently developed Addison's disease, an ailment resulting from lack of the hormone produced by the cortex of the adrenal glands. His blood pressure continued high while the Addison's disease was being treated with synthetic adrenocorticohormone. When, however, he was treated with salt alone instead of the synthetic gland chemical, his blood pressure dropped to normal limits.

The mechanism by which the adrenal gland cortical hormone affects blood pressure is a matter for speculation, Dr. Perera comments.

Science News Letter, November 10, 1945

NEW PLASTIC—Forticel, produced by Celanese Corporation of America, is lighter, more lustrous, tougher and odorless. (See SNL, Oct. 27)

PSYCHOLOGY

How Russians Think

They make heated claims but later cool off; American diplomats should wait until their mood moderates and then talk business.

➤ WHEN the Russians make unacceptable, heated claims in an international conference, just wait patiently. Give them time and they will naturally cool off and become less emphatic. Then step in quickly and close the bargain.

This is the advice to diplomats that might be based on an analysis of Russian ways of thinking made by a Russion-born psychologist, Prof. Gregory Razran, of Queens College, New York.

Russian habits of thinking are very different from those of Americans, Prof. Razran, who has lived in this country for more than 20 years, said. Americans are likely to weigh the pros and cons of a situation as they study it. Russians plunge forward with an idea, pursuing it with full force and enthusiasm to the neglect of any other point of view and then later, sometimes quite suddenly, begin to consider the other side of the question.

Americans in a debate will say, "Yes—but . . ." Russians say, "No. No! NO!—well, yes." When they are in the "No" mood nothing is to be gained by protest or argument; better wait until they lose their steam.

In some ways, Prof. Razran explained, Russian thinking has much more in common with American thinking than has that of the British or many of the nationalities of Europe. The Russians are very realistic, inclined to face problems frankly and are very direct.

The writings of Lenin, Hegel and Marx, Prof. Razran said, and not of Tolstoy or Dostoyevsky, are the key to understanding of the workings of the current Russian mind.

The Russians hate hypocrisy and appreciate being dealt with frankly and even with bluntness. The most frequent term of opprobium used by Lenin against his enemies was "hypocrite." He apparently believed that calling names may be useful as a means for getting grouches off the chest. The Russians are very wary of covering up or whitewashing bad situations or assuming pollyanna or "keep-your-sunny-side-up" attitudes. They have no patience with empty substitutes. Russian soldiers have no pin-up girls.

Russians think a great deal about their ideals and principles. And they are always trying to figure out and appraise the ideals of other people. If our own diplomats do not define our principles to the Russians, they will attempt to define them for us, Prof. Razran pointed out. The reason that the late President Roosevelt was greatly admired among Russian leaders was due to FDR's reputation in Russia as an idealist.

Russians are extremely proud of and sensitive to criticism of their country, but are very modest, even self-effacing about their individual achievements. The American who praises the individual but disparages the Soviet system gives serious offense to his Russian friend.

Russians have a high regard for technology, science and intellectual achievement in general. For this reason, probably the best emissaries for promoting goodwill between the two nations are the scientists and engineers.

Science News Letter, November 10, 1945

PHYSICS

Sensory Aid for Blind

Will permit its user to locate all obstacles within a radius of 20 feet by using a photoelectric cell and a beam of light.

➤ SUPPLANTING the blind man's white cane and seeing-eye dog, a sensory aid device, under development by the Army Signal Corps for six months, will permit its user to locate all obstacles within a radius of 20 feet by means of a photoelectric cell and a beam of light, it was announced by Maj. Gen. Harry C. Ingles, chief signal officer of the Army.

At present not sufficiently perfected for practical use, a nine-pound experimental model, turned slowly from side to side in the path of the user, detects objects within a 20-foot range and conveys the distance in a coded tone signal by means of an earphone to the user.

Designed by Lawrence Cranberg, physicist, the experimental model's three-watt lamp beams a narrow finger of light through a focusing lens in the front of the case, in a ray about two inches in diameter. Upon striking an object, the ray is reflected back through a second lens in the front of the case, which refocuses the beam in a tiny point of light to the receiving unit, consisting of a revolving disk mounted in front of the photoelectric cell. The disk is divided into five concentric rings, containing one or more holes to permit the ray of light to strike the photoelectric cell. The angle of the reflected beam, changing with the distance of the object from the device, strikes the inner concentric ring of the disk at the maximum range of 20 feet, and moves downward on the disk as the object nears. The inner ring contains only one small hole, and as the disk moves at the rate of one revolution per second, the light would strike the photoelectric cell for an extremely brief period of time in each revolution. The energy, created by the photoelectric cell as the light reaches it, is relayed to the earphone by a standard commercial hearing aid, giving the code tone. An object five feet distant would reflect the ray of light to the fourth concentric ring, which has one small and one large hole, giving a signal of one long and one short tone, as in the dot-and-dash of the Morse code.

The five rings indicate approximate distances of three, five, eight, 11 and 20 feet from the user to the object. With practice a blind person could determine exact distances by the overlapping of the signals as the light strikes areas between the rings.

The problem of filtering out disturbing signals from sunlight and ordinary electric lights was solved by an amplifying system sensitive only to modulated or "pulsed" light, and then modulating the light ray to that frequency.

Further development programs in supersonic and radar waves are also being conducted by the Signal Corps.

Science News Letter, November 10, 1945

ORNITHOLOGY

British Radar Clocks Invisible Flying Geese

➤ WILD GEESE flying at night have been tracked by radar operators on the eastern coast of England, so accurately that their ground speed could be measured, it is reported by David Lack and G. C. Varley of the Army Operational Research Group, Ministry of Supply, (*Nature,* Oct. 13). Radar pick-ups of bird flocks were made as early as 1941, and similar occurrences have been reported from other countries, including the United States; but it is only now that wartime restrictions on publication of the information have been lifted.

Longest radar track on a flock of geese thus far recorded was one made by a station of the R.A.F. on the coast of East Anglia. The birds were kept in the radar field for 99 minutes, during which time they flew 57 miles—an average of 35 miles an hour. Another station picked up the same flock and tracked them for an additional 22 miles, at a ground speed of 33 miles an hour. The geese were never seen, but when they crossed the coast near a Royal Observer Corps post they were identified by their call as gray geese.

Gulls as well as geese have been picked up by radar, and even small birds travelling in flocks. Experimental proof that birds actually do produce radar echoes was produced by suspending a dead gull beneath a balloon and "radaring" this known target. The echo from the bird's body could be clearly distinguished from that produced by the balloon.

When approaching flocks of birds were first detected by radar it created some confusion, but this did not last long because of the great difference in speed between even the fastest of birds and the slowest of airplanes. Birds continued to create some disturbance, however, because their speed is close to that of fast surface craft. During the war, birds gave rise to several E-boat scares and to at least one invasion alarm.

Science News Letter, November 10, 1945

PHYSICS

Nazis Used Infra-Red Rays To Detect Fighting Tanks

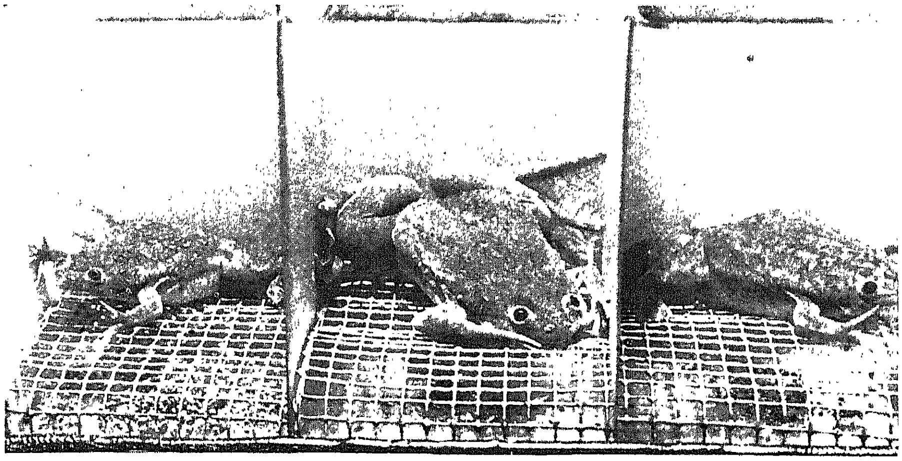
➤ INFRA-RED rays were used by the Germans during the latter days of the war to detect Allied fighting tanks at night, it is now revealed. Since infra-red rays are not visible to the human eye, the Allied tankmen did not know they were being illuminated.

This is one of the startling advances made by German scientists that might have prolonged the war if the Nazis had been able to hold out a few months longer, according to Dr. Charles F. Green, of the General Electric Company, who recently returned from Germany where he served on an Army mission.

The infra-red rays were the results of infra-red filters positioned on German searchlights. If these filtered searchlight beams hit the Allied tanks, they bounced back to devices known as "bildwandlers," or "image changers," mounted on German tanks. These devices transformed the infra-red rays into an image of the opposing tank, Dr. Green states, and the gunners opened fire.

Research in German laboratories, and the use of that knowledge in making armaments, according to Dr. Green, were coming ahead so fast at the end of the war that the Allies' margin of superiority was rapidly decreasing.

Science News Letter, November 10, 1945



ODDEST TOADS—Xenopus toads in their laying cage. The netting is to prevent them from eating their own eggs. Note the extremely wide, webbed hind feet, tiny, hand-like forefeet; also absence of eyelids.

ZOOLOGY

World's Oddest Toads

Are being used for pregnancy tests which require only four to 12 hours instead of 48. Are completely unlike the "regulation" toad.

➤ WASHINGTON is the temporary home, just now, of a colony of the oddest toads in the world. They are as completely unlike the "regulation" toads that all of us know as can well be imagined. They haven't any warts. They don't sit blinking their eyes while they wait for a chance to snare an insect with a lightning-like snap of a long tongue, because (a) they are as completely aquatic as catfish, so they never sit on anything, (b) they haven't any eyelids, so they can't blink, (c) they haven't any tongues at all. Being so unlike the familiar, land-dwelling toads and even more water-loving than frogs, they are often called frogs; but zoologists still classify them as toads.

They come from Africa, and their formal name is *Xenopus laevis*. Familiarly, they are sometimes called clawed toads (or clawed frogs) because there are sharp little claws on three of the toes of each broad, paddle-like hind foot.

Most of them are at present in the U. S. Fish and Wildlife Aquarium, under the main lobby of the Department of Commerce building. Some, however, have been placed on public display at the National Zoölogical Park, and there are other collections also in New York, Chicago and Philadelphia.

They are here on business—medical business. Physicians use them instead of the Aschem-Zondek pregnancy test, because it requires only four to 12 hours instead of 48 hours. If a little body fluid from a woman who thinks she may be going to have a baby is injected into a female Xenopus with a hypodermic syringe, and the toad begins to lay eggs, the test is positive. More than 1,000 such tests are now being made each month.

The toads were brought to this country by a Merchant Marine officer, Lt. Jay E. Cook, of New York. On his wartime cruisings, he made contact with a good source for wholesale toad exports in Africa, and arranged to have a shipment of 3,000 of them sent. Of these, 2,822 made the long voyage successfully—a very good score. Another shipment, of 2,000 animals, is on the way.

Lt. Cook feeds his toads on ground beef hearts, mostly. They will also eat liver, horsemeat, clams, minnows, tadpoles—even their own kind of tadpoles, for like all the frog-toad tribe they are cannibals. In their native home (which is most of Africa south of the equator) they feed on worms, drowned insects and small wiggling things that they can catch in the water. Since they have no tongues, they have to put their food into their mouths with their small, hand-like front feet.

Although they spend their entire lives in the water, and will die like fishes if kept out of it for any length of time, they are strictly air-breathers. Consequently they swim to the top about every 10 minutes, stick the tips of their noses above the surface long enough to catch a breath, then let themselves sink to the bottom again.

There have been some proposals to grow them in this country, in the frog-farm region along the Gulf Coast. The climate there is favorable enough; nevertheless, Lt. Cook does not anticipate attempting it, for the present at least. So long as he can get a good supply from Africa, Xenopus will probably remain on an import basis. No one has ever suggested levying a protective tariff on toads.

Science News Letter, November 10, 1945

ELECTRONICS

Television "Eye" Sensitive To Candle-Lighted Scenes

➤ EXTREME sensitivity is the striking feature of a new television "eye" revealed by the Radio Corporation of America. It is a television camera tube of revolutionary design, so sensitive that it can pick up scenes illuminated only by candle or match light, or scenes with invisible infra-red rays in a blacked-out room. It is claimed to be 100 times more sensitive than conventional pick-up tubes.

In appearance the new tube, called the RCA Image Orthicon, resembles a large tubular flashlight in size and shape. It is about 15 inches long, with a shank about two inches in diameter, and a head three inches in diameter and three inches long. It has three main parts: an electron image section, an improved Orthicon-type scanning section, and an electron multiplier section in which the relatively weak video signals are magnified before transmission.

The principle on which the tube is based is known as secondary electronic emission. This involves the use of electrons from a primary source as missiles to bombard a target, or a series of targets, from each of which two or more electrons are emitted for each electron striking it. The primary source in the tube is a photo-sensitive face on which the light from the scene being televisioned is focused by an optical lens system.

Science News Letter, November 10, 1945

MEDICINE

Better Treatment For Cirrhosis of Liver

➤ BETTER treatment of cirrhosis of the liver may come from laboratory findings of the effect of a relatively new goiter remedy, thiouracil, it appears from a report by Dr. Paul Gyorgy of the University of Pennsylvania and Dr. Harry Goldblatt of Western Reserve University. (*Science,* Nov. 2.)

Cirrhosis in rats can be prevented by adding one-tenth of one percent of thiouracil to a diet that ordinarily produces cirrhosis in these animals, the scientists found.

The chemical's effect is achieved by its interference with production of the thyroid gland's hormone. This action relieves patients with the kind of goiter due to an over-active thyroid which produces too much hormone.

The thyroid, however, has wide influence on various processes in the body, and when it is slowed, these other processes are slowed down. As a result, it may slow the rate at which the body uses its supply of the animo acid, methionine. This sparing of methionine would help cirrhosis patients, the scientists point out, because too little methionine in proportion to the amount of another amino acid, cystine, is considered the leading dietary factor causing cirrhosis.

Methionine protects the liver not only from purely dietary cirrhosis but also from cirrhosis due to poisons such as carbon tetrachloride.

The application of the rat studies, the scientistst state, would be to use thiouracil "as a supporting measure in the treatment of cirrhosis in combination with a diet rich in protein and methionine."

Possibility of damage from thiouracil, for it is a chemical that must be used with care, is offset in the case of cirrhosis by the great advantage of any possible improvement in this grave condition.

Science News Letter, November 10, 1945

PATHOLOGY

Guinea Pigs Develop Uninvited Fatal Infection

➤ GUINEA PIGS, those meek little martyrs of science that obligingly develop "made-to-order" infections of human germs so that new drugs like penicillin and the sulfa compounds may be tried out, can also have fatal diseases of their own, unbidden and very definitely unwanted by the scientists. A highly fatal infection of this kind, resembling human pneumonia, has been giving trouble in breeders' stocks in the Boston area, a group of Boston medical scientists report. (*Science,* Nov. 2.) Not only do many of the animals die, but other apparently healthy ones act as immune carriers of the fatal bacteria. Sulfadiazine appears to be fairly successful in saving the lives of infected quinea pigs, but does not clear up those that were functioning as carriers of the disease.

The investigation was made by Dr. F. Homburger, Dr. Clare Wilcox, Dr. Mildred W. Barnes and Dr. Maxwell Finland, representing the Thorndike Memorial Laboratory, Second and Fourth Medical Services (Harvard), Boston City Hospital, and the Department of Medicine of Harvard Medical College.

Science News Letter, November 10, 1945

GEOLOGY

Oil Research Center To Be Opened in Houston

➤ A NEW oil exploration and production research center, to be devoted to studying new methods of finding oil and getting it out of the ground, will soon be built in Houston, officials of the Shell Oil Company announced.

The million-dollar research center is expected to be completed by spring. It will house the company's recently organized division of exploration and production research, an independent entity within the Shell organization.

The research program of the new laboratory will focus attention on augmenting America's petroleum resources by developing new and more efficient methods for discovering oil and for recovering it in quantities from the underground reservoirs in which it is found. The discovery of new reservoirs is becoming increasingly difficult and large quantities of oil in present reservoirs are not being brought to the surface by present production methods, oil experts agree.

Research in physics, chemistry and geology, as they relate to petroleum exploration and production, will be carried on at the laboratory. It will also serve as an instruction center for training exploration and production field men in new techniques and methods.

Director of the new division is Dr. Harold Gershinowitz, who for the last few years has been research director of the company's manufacturing department in New York.

Science News Letter, November 10, 1945

IN SCIEN

ENTOMOLOGY-CHEMISTRY

DD Found Effective Against Wireworms

➤ DD, a kind of chemical second cousin to DDT, is the newest weapon that chemistry has added to the arsenal of agriculture for the struggle against insect pests. This compound, which is dichloropropane dichloropropylene when spelled out in full, has been found effective in stopping the ravages of soil-dwelling wireworms, in large-scale field tests conducted by W. H. Lange, University of California entomologist.

The chemical is introduced into the soil with a special drill, about 400 pounds being used to the acre, from one to three weeks before the crop is planted. The fumigating effect of the DD is sufficient to get the wireworms under control, with subsequent great increases in crop yields.

Wireworms are the hard-shelled larvae of click-beetles. There are many species of them, and practically all are destructive pests, feeding on the roots and other underground parts of plants.

Science News Letter, November 10, 1945

PUBLIC HEALTH

First Aid Textbook To Aid Civilians

➤ ADD TO your list of peacetime benefits from the war a completely new and improved book on first aid, the *American Red Cross First Aid Textbook* just off the press.

Between the gray, red-cross-emblazoned covers familiar to thousands, many of the medical lessons of the war are brought to civilians for their use in highway, home and industrial accidents which often rival war injuries in their danger to life and limb.

The scientists on various committees of the National Research Council which sponsored and guided much medical research during the war have cooperated with surgical, medical and educational experts on Red Cross staffs in making this book up-to-date both in scientific content and as a textbook.

Prevention of accidents is stressed as well as proper first aid to accident victims.

Science News Letter, November 10, 1945

E FIELDS

CHEMISTRY

Synthetic Caffeine Produced Domestically

➤ CAFFEINE, that causes the stimulating effect in coffee, tea, soft drinks and certain medicines, will soon be in production synthetically in a vast plant to be constructed by the Monsanto Chemical Company in St. Louis. Domestic production of this synthetic caffeine will free the United States from dependency on foreign-produced natural sources.

Although scientists have long known how to duplicate the natural product's complicated molecular structure in the laboratory, caffeine until now has been derived almost exclusively from such sources as tea waste and surplus coffee, or indirectly from cocoa cake, a by-product of chocolate manufacture. The new plant will use a new process, details of which are not revealed, except that the synthetic material, simulating the process of nature, will be derived from nitrogen from the air and hydrogen from water.

Science News Letter, November 10, 1945

ZOOLOGY

Use of 1080 Restricted To Professionals

➤ USE OF 1080, the war-born super-rough-on-rats, is to be restricted to professional rodent-killers for the present at least, according to a recommendation by Dr. Ira N. Gabrielson, director of the U. S. Fish and Wildlife Service. The stuff is so poisonous to other animals, and even to human beings, that its general release for civilian use is not considered safe until after considerable further research has been done, giving a basis for precautions and regulations that will make its general distribution less risky.

The new rodenticide has been used with considerable success in cleaning up rat infestations around Army camps and in urban war centers, and also in reducing the numbers of ground squirrels and other wild rodents on rangelands in the West, where they not only destroy forage needed for livestock but also serve as potential reservoirs of bubonic plague through the presence in their fur of disease-carrying fleas.

As an example of the extreme poisonousness of 1080, Dr. Gabrielson mentioned one bait, in which one pound of it was distributed through two tons of grain. One-thirtieth of an ounce of this poisoned grain was enough to kill a ground squirrel—the single pound of 1080 was thus potentially able to wipe out more than 1,800,000 of the animals.

Chemically, 1080 is sodium fluoroacetate; the number is simply a convenience-designation.

Science News Letter, November 10, 1945

PHYSICS

Superfine Glass Fiber Linings for Clothes

➤ SLEEPING bags, mittens, hunting jackets and other cold-weather, out-door clothing may be interlined with down-like, superfine glass fibers similar to those used during the war for sound and heat insulation in the B-29's. These feather-soft fibers have an average diameter of only five one-hundred-thousandths of an inch.

Because the superfine glass fibers are inorganic, and contain no protein substance that can cause an allergy such as asthma, the Owens-Corning Fiberglas Corporation is exploring the possibility of using the fibers in pillows and mattresses. Bedding dust resulting from the disintegration of the organic materials usually used is considered the principal cause of distress to more than a million asthma victims.

Science News Letter, November 10, 1945

CHEMISTRY

Glass Bottles Improve Evaporated Milk

➤ MARKETING evaporated milk in glass bottles instead of the long-familiar tin cans becomes a possibility through the sterilizing machine on which patent 2,388,103 was granted to three Baltimore inventors, Dr. Randall Whitaker, Dr. Robert P. Myers and Robert E. Homberger, assignors to Sealtest, Inc. After the milk has been evaporated and filled into the bottles, the whole operation is conducted either in an atmosphere of an inert gas or under vacuum, in order to exclude flavor-spoiling oxygen. The bottles are spun rapidly in order to agitate the milk, while sterilization heating is carried on at a temperature between 280 and 300 degrees Fahrenheit for from three to five minutes. Superior color and flavor are claimed for evaporated milk bottled by this process.

Science News Letter, November 10, 1945

AERONAUTICS

400,000 Civil Airplanes Predicted for 1955

➤ OVER 400,000 civil airplanes will be in use in the United States by 1955, and more than 900,000 jobs will be created by aviation.

These are predictions of the Civil Aeronautics Administration. These civil airplanes do not include commercial craft operating on regular schedules, but do include personal planes and aircraft for special jobs.

Of the 400,000 aircraft, a report states, 280,000 will be used for personal business and recreation; 40,000 by business concerns to speed up their sales and administration activities; and 80,000 by commercial aircraft services in crop-dusting, aerial photography and other non-scheduled operations.

A total of 901,300 jobs hinged around civil aviation by 1955 is predicted, a great increase over the 142,300 similar positions in 1939. Approximately 70% of these jobs will be in aircraft production and operation, the others in work derived from civil aviation.

Science News Letter, November 10, 1945

OPTICS

Polarizing Lenses Made of All-Glass

➤ POLARIZED light, that is, light in which all wave-fronts are parallel, has been produced for some time by passing ordinary light through filters containing minute crystals that have been brought into parallel alignment. Hitherto these filters have been made of plastic materials, which have to be protected against heat, scratching and other damage by sandwiching them between sheets of glass.

To overcome this production complexity, Harry H. Styll of Southbridge, Mass., has invented an all-glass polarizing lens. Into his glass mix he introduces a quantity of minute mineral crystals of suitable shape, usually crystals of tourmaline or peridote. Then while the glass is still plastic he subjects it to stretching, which brings the axes of the crystals into parallel, and hence polarizing, alignment. After hardening, the glass may be cut and ground into lenses in the ordinary manner.

Rights in Mr. Styll's patent, No. 2,387,308, have been assigned to the American Optical Company.

Science News Letter, November 10, 1945

MEDICINE

Hospital Gymnastics

Exercise may be classed as required medicine for the sick. Leg-stretcher, chest lifter, lung conditioner are only a few of the forms now used.

By LT. H. N. GARDNER, USNR

➤ "HEY! What is this? A hospital or a gymnasium?"

Civilians may soon be echoing the surprised reaction of many ill or wounded servicemen as returning physicians introduce into civilian hospitals methods of physical rehabilitation they have learned during the war.

For exercise is good medicine. The dramatic saving of lives by sulfa drugs, penicillin, plasma, and whole blood have captured the popular imagination; but, to the average patient, and particularly to those who are bedridden or crippled, the advances of physical rehabilitation may be the most important development to come out of this war.

Up to the present, civilian hospitals have been overworked and understaffed. They have had more than they could do to take care of their patients, and have had neither the time nor the personnel to try new ideas. But as the doctors come back from the armed forces, authorities believe that physical rehabilitation for the average patient may come to be standard treatment in all hospitals.

For Civilians Too

There will be differences, of course, between civilian and military methods. The very young and the very old cannot be given the same treatment as those of military age. And, more important, the civilian leaves the hospital sooner, and does his convalescing at home, while the soldier or sailor stays until he is ready for duty. Thus the civilian would get supervised exercise for a shorter time, and most doctors agree that few patients would keep it up at home. Some visualize a sort of "out-patient gymnasium," where patients would come back for prescribed exercises after they have left the hospital.

Particularly active in this direction is the Baruch Committee on Physical Medicine, which has recently outlined plans for community rehabilitation centers to integrate the medical, social and educational services of the community. Included in their proposal is a physical medicine center which would offer physical rehabilitation as well as the more familiar physical and occupational therapy.

Whatever happens, few medical officers think that those who have seen how even bedfast patients can keep up their strength and morale through exercise will be content to return to the old methods of "bed and boredom."

Remedial exercise, physical therapy, and occupational therapy, as methods of restoring function to injured nerves, damaged muscles, and stiffened joints, came into widespread use partly as a result of experience in the first World War. But it was not until this war that doctors came to realize the importance of physical conditioning for all types of patients.

Never before had physical training been taken so seriously by the armed forces. Soldiers and sailors were brought into top condition in training camp, and kept that way; even the brass hats left their desks for daily periods of calisthenics in the corridor.

When a man was hospitalized even for a short time, he came back cured of his disease, but far behind his buddies in physical condition. After two or three weeks in bed, arches sometimes weakened until marching, even without a heavy combat pack, was out of the question. Men had to be taken out of outfits bound for combat, or put on light duty where their intensive training for their regular jobs was wasted. So the medical officers decided to see whether physical reconditioning could safely be started during convalescence, before discharge from the hospital.

The results were surprising. The men not only went back to duty in better condition; they got well faster. Men who were literally "bored stiff" took a new interest in life as their aches and weakness faded away, and were "rarin' to go" at a time when they would otherwise have been sitting listlessly around the convalescent wards.

Encouraged by this success, medical officers began giving exercise earlier and earlier in the course of treatment, until today a majority of military patients find themselves doing sit-ups or up-side-down bicycling even before they are allowed out of bed. A man with part of his body in a cast, or with a leg paralyzed, puts the rest of his muscles through their paces every day; even if he can only wiggle his fingers and toes, he does that regularly, and takes more and more exercise as his condition improves. Only if he is critically ill, or has a fever, will he be excused. Even if he has just been operated on, he can still do some exercises safely, and his recovery will be faster because of it.

"But isn't it dangerous?" many people ask, remembering that bed rest and quiet have always been standard treatment for most ailments.

The answer is "No"—not if it is properly supervised. Unrestricted exercise might cause trouble, it is true, but the Army or Navy doctor today prescribes exercises just as he prescribes medicines.

In the Navy's hospitals, for example, each new patient is promptly classified by his doctor in one of five groups, depending on the amount of activity he should have. The doctor checks over a list of standard exercises for that group, and crosses out any which he thinks should not be used. Then the physical training specialist takes over, holding regular exercise periods on the wards. When the patient can get out of bed, he joins a new group for more vigorous calisthenics; later on, if he is well enough, he can go in for outdoor sports, graded from horseshoe pitching and shuffleboard up to softball and touch football.

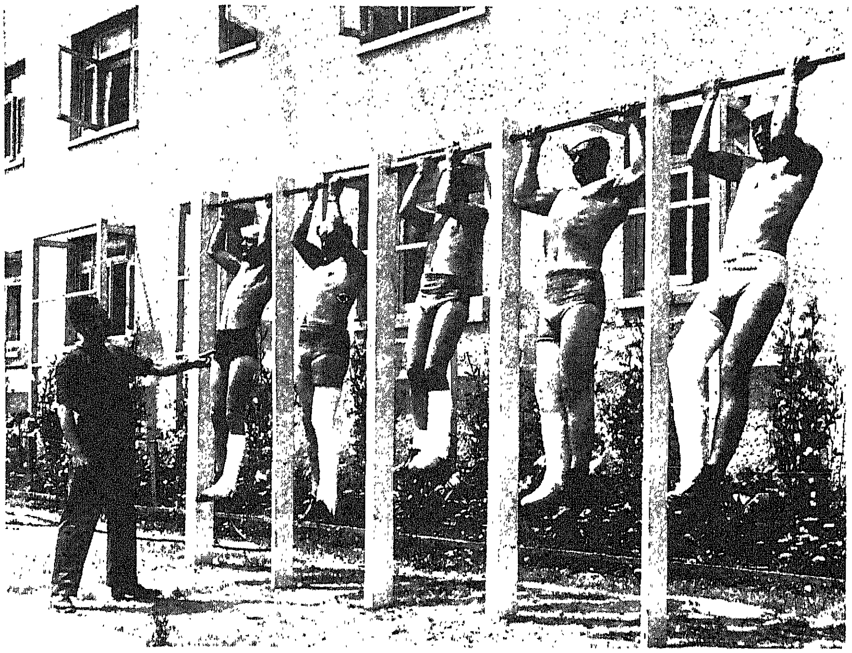
Exercise Routine

Suppose, for example, that you were a sailor or a leatherneck and had just had your appendix removed. At first you would just take it easy, getting over the effects of the operation and the ether. But after a day or two, when you were feeling better, your doctor would start you on a few simple exercises like these:

Waker-Upper: Lie on back, fists clenched beside shoulders. 1. Press head and elbows down against mattress. 2. Press harder. 3. Press still harder. 4. Relax.

Leg-Stretcher: Lie on back, with pillow folded double under knees. 1. Straighten legs forcibly, pointing toes down hard. 2. Relax. 3. Straighten legs forcibly, pointing toes up toward head. 4. Relax.

Chest Lifter: Lie on back, arms folded on bed across top of head. 1. Press head and shoulders against bed, arching upper



GOOD MEDICINE—Men with a leg in a cast exercise on chin bars. Even bed patients are expected to use special apparatus to keep them fit while getting well.

back, raising chest toward head. Keep hips on bed. 2 Relax. 3. Repeat. 4. Relax.

Lung Conditioner: Lie on back, hands on hips. 1. Inhale (chest breathing) in four counts, taking a deeper breath each count. 2. Exhale in four counts. Try to empty lungs on last count, and tighten buttocks.

Every morning and afternoon the physical training specialist would come to the ward and put you through this series twice. At first you would do each one only two or three times; later you would work up to ten or fifteen repetitions. In four or five days you would add a few exercises which take a bit more effort, but still without putting a strain on the abdominal muscles. And after two weeks, you would be using these muscles, avoiding sudden strains, but giving them a good workout in easy stages.

It is not only weakened muscles that benefit from physical training; there are other mental and physical results which can be just as important. Physical condition has a lot to do with mental health, and the outlook of both normal and neuropsychiatric patients is much improved by this program.

More unexpected are the effects in transverse myelitis cases, paralyzed from the waist down; the Navy reports that, in addition to strengthening the arm and trunk muscles to the point where these patients can get around without help, regular exercise prevents two conditions which had always troubled them—the formation of bladder or kidney stones, and decalcification of the bones of the legs and feet.

Science News Letter, November 10, 1945

AERONAUTICS

Travels 400 Miles an Hour

➤ LATEST in Grumman's line of fighting "cats," the newly developed Bearcat, sister ship to the Wildcat, Hellcat and Tigercat, is said to be superior to either the Wildcat or Hellcat in both speed and maneuverability.

Although lighter by about a ton and a half than the Hellcat, the Bearcat, designated as the F8F, has the typical Grumman clipped wing tips, stubby fuselage and low-winged outward appearance of the Hellcat. Powered by a single-stage Pratt-Whitney radial engine, developing more than 2800 horsepower with water injection, the F8F is armed with four .50-caliber machine guns and is equipped with racks to carry rockets and bombs.

Manufactured by the Grumman Aircraft Engineering Corporation at Bethpage, Long Island, N. Y., the Bearcat is believed to be the fastest carrier-based, propeller-driven fighter in the world at sea level, making over 400 miles an hour in level flight. Extreme range of 1,500 miles under ferry conditions and a rate of climb of nearly a mile a minute are claimed.

While Grumman was concentrating on carrier-based fighters, the Republic Aviation Corporation at Farmingdale, Long Island, had an experimental Army fighter flying at speeds in excess of 500 miles an hour as early as August, 1944. Of a long line of P-47 Thunderbolts, the XP-47J dispelled the fallacy that propeller-driver, reciprocating-engined aircraft could not reach a level flight speed of 500 miles an hour.

The Pratt-Whitney radial engine was equipped with a propeller-driven cooling fan in the motor cowling, in addition to the air intake ports. The exhaust of the turbo-supercharger, jetting into the air beneath the plane, just forward of the tail assembly, is said to have added 400 horsepower to the normal thrust of the engine.

Production of the XP-47J series would have required complete retooling of the Republic plant, so only one 47J was constructed, but certain features and engineering improvements of the experimental plane were incorporated into later models of the Thunderbolt.

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The *myrtle warbler* receives its name from its favorite foods; the wax berries of the myrtle.

The succulent stalk by which the popular *cashew nuts* are attached to the cashew tree yields flesh and juices used in the manufacture of preserves, wines, liquors and ice cream.

THE SCIENTIST IN ACTION
by W. H. GEORGE
A SCIENTIFIC STUDY OF HIS METHODS

This book is for those who need to do ORIGINAL thinking, CLEAR thinking, THINKING WITH A PURPOSE. Helps you to DISCOVER ideas, tells you how to DEVELOP them! Explains clearly METHODS OF WORKING to get RESULTS.

H. G. WELLS Writes To The Author ". . . I took up your book about a quarter to eight. At nine my parlour maid came to ask if I wanted any dinner tonight. It is now close on to midnight. But I realize now that your book is of the UTMOST IMPORTANCE and I feel tremendously lit up by it . . ."
Most respectfully yours,
H. G. Wells

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Do You Know?

The young *May-fly* lives in water for three years before emerging as an adult.

Milk is as *nutritious* for some bacteria as it is for man.

Frogs have longer legs than toads and lay their eggs in clumps instead of strings.

Nineteen new *diamond* deposits have been discovered in the past three years in the Ural mountatins in U.S.S.R.

The Australian *button-quail* is a grassland bird resembling, but not at all related to, the American true quail.

Plowing is the fundamental field job of all more advanced agricultural countries and requires more power by far than any other farm operation.

Nitrogen applied to *peach trees* in California resulted in increased yields, but applied to prunes gave no results over a five-year period.

The *soupfin shark* seldom exceeds six feet in length but its liver is large in proportion to its body and the liver oil is particularly rich in vitamin A.

The first regularly scheduled radio *broadcast* was a report on returns of the Harding-Cox presidential election made 25 years ago, on Nov. 2, 1920.

Beets need more sodium than they can get from most soils; therefore common salt is used by some beet growers as a fertilizer.

Soybean meal should not exceed 10% of the total diet fed to hens producing eggs for hatching because a greater amount, it is found, may reduce the hatchability of the eggs.

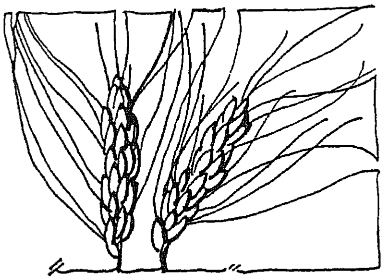
Mature *corn,* which contains usually about 40% moisture, loses about 21 pounds of water per bushel in drying to a 20% moisture content when it is in condition to be put in storage.

Spices, such as sage, cinnamon, pepper, ginger, ground mustard, paprika, nutmeg and others, were provided for soldiers in relative abundance; contracts for over 1,800,000 pounds have now been cancelled.

AGRICULTURE

NATURE RAMBLINGS

by Frank Thone



Costly Exports

➤ FAMINE stalks in Asia, threatens to provoke rioting, even revolution, in Europe this winter. America, and other countries that have food surpluses, must come to the rescue. Practically everyone is agreed on that, public opinion polls show: even extreme nationalists and isolationists have given grudging assent—though they will doubtless make the alms-loaf bitter by passing it out with a snarl or a sneer.

Without joining that sorry company, it is still possible to point out that we can make our charity too costly to ourselves. Back in the expansive days of the late nineteenth century, when this country was a heavy exporter of grain and meat, a favorite heart-warming boast was that "America can feed the world." Our parents took pride in the departure of deep-laden grain ships, a magnified reflection of the pride of the housewife in "setting a good table."

Not for another generation did we begin generally to realize what those generous shiploads were really costing us. A half-century ago, people still talked of the "inexhaustible fertility" of our prairie soils. We saw gullies appearing in many fields, and our rivers becoming thick with mud, but not until such prophets as Hugh Bennett and Walter Lowdermilk began to cry "erosion" in the marketplace did we begin to think of the dark exports of our topsoil that went to sea along with the shiploads of flour and pork. Even now we are only making a beginning of remedial measures.

We have just finished a war in which we poured out our treasure, and lives that were dearer than treasure, without stopping to count. To ease the direct distress of this first postwar winter, we can perhaps afford one more gesture of reckless generosity, and for one more season overplow and overplant on soils that we know will bleed anew because of it.

Hereafter, though, we must find a more effective and less wasteful way of helping our neighbor than giving him a hasty loaf when he is hungriest, and neglecting him the rest of the time. With famine as with disease and war, prevention is far better than frantic emergency efforts to cure. One of the most practical steps that can be taken is the world-wide campaign for improving food-producing methods advocated by the United Nations Food and Agriculture Organization. Show the presently inefficient farmers in famine-liable lands how to conserve their soil and at the same time stabilize their production at a higher level, and there will be less frequent need to come to the rescue with hurried shiploads of donated food. The best agricultural export this country can send out is agricultural know-how.

Science News Letter, November 10, 1945

CHEMISTRY

Cork-Like Porous Plastic For Lining Bottle Caps

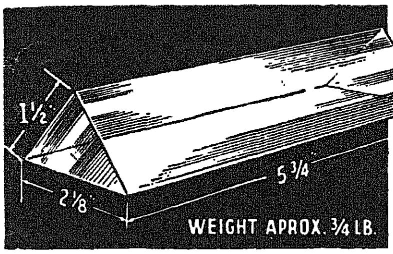
➤ A CORK-LIKE synthetic substance suitable for lining bottle caps is the subject of patent 2,387,730, granted to W. L. Alderson, Jr., of Wilmington, Del., who has assigned his rights to E. I. du Pont de Nemours and Company. The invention is essentially a method for making already known plastics, the polymers of ethylene, uniformly porous. The trick is relatively simple: the polymer is heated in the presence under pressure of ethylene gas, which will of course dissolve in the mass. The pressure is partially removed, whereupon the dissolved gas forms innumerable small bubbles. Then the residual pressure is held constant while the temperature is rapidly reduced, causing the plastic to solidify in its normal elastic state, with the bubbles "frozen" in place.

Science News Letter, November 10, 1945

Chlorophyll, the green pigment of plants, is really a four-fold mixture, consisting of green chlorophyll A and chlorophyll B, and two brown pigments: carotin and xanthophyll.

In 1944 the average potency of *penicillin* was around 200 units per milligram, while today every lot is over 350 units per milligram and runs as high as 1100 units in a milligram

WAR BARGAINS in LENSES and PRISMS



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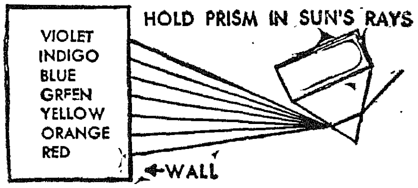

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In order that the tank driver shall not get shot in the face, 2 of these Silvered Prisms are used to make a Periscope. We have secured a number of these that are very slightly chipped, making possible their sale at a very low price. They are 90-45-45 degree Prisms of huge size—5¾" long, 2½" wide, finely ground and polished. Used to build a Periscope . . . excellent also for experiments, classroom demonstrations. Some of our ingenious customers have used these prisms to make camera stereo attachment, range finder, etc. Prism easily converted into desk name plate by affixing gold letters. 100 gold letters supplied at only 10c. (Order Stock No. 3008-Q.) Normally these prisms would retail from $24 to $30 each.

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3009-Q	Porro	52 mms.	25 mms.	1.00
3010-Q	Porro	43 mms.	21 mms.	.50
3016-Q	Pentagon	45 mms.	22 mms.	.75
3029-Q	Dove	16 mms.	65 mms.	1.25
3036-Q	80 Degree Roof	60 mms.	36 mms.	4.00
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3049-Q	Right Angle	69 mms.	167 mms.	10.00
3047-Q	Right Angle	53 mms.	103 mms.	4.00
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AERONAUTICS

Aerial Attacks Evaluated

German submarines, planes, oil and transportation were wiped out one by one. Report includes military, economic and morale effects.

➤ A SCIENTIFIC and strategic evaluation of the effects of the aerial attacks on Germany by the Allied air forces during the war is given in an official over-all report released by the U. S. Strategic Bombing Survey headed by Franklin D'Olier, with Charles C. Cabot as secretary. The Survey, with civilian officials, was established in November, 1944, by the Secretary of War, and its headquarters was in London. It covers military effects, economic effects, and effects on the morale of the civilian population.

The report includes data on bombing activities, but states, "Of far more significance than statistics of strength and damage is the outstanding fact that the Allied Air Forces won the air war over Germany and obtained mastery of the skies of Europe." Because of this, Germany was fatally weakened because it was denied such vital military needs as oil, planes and tanks.

The Survey, with a staff of 300 civilians, 350 officers and 500 enlisted men, secured first-hand information on damages in Germany from bombs by inspection and from captured German reports. Members of the staff also interviewed captured officers, including members of the German General Staff.

In the spring of 1943, the report states, Allied naval and air power scored a definite victory over German submarines. After that, "submarines were dropped from first priority and the German aircraft industry was substituted. The German ball-bearing industry, the supplier of an important component, was selected as a complementary target."

An adequate supply of anti-friction bearings was correctly assumed to be indispensable for German war production.

After a reduction in German air power through destruction of planes, oil became the priority target in the German economy. "The German oil supply was tight throughout the war," the report declares, "and was a controlling factor in military operations."

"The chief source of supply, and the only source for aviation gasoline, was 13 synthetic plants together with a small production from three additional ones that started operation in 1944," the statement continues. Because of air attacks, production from the plants declined steadily and by July 1944 every major plant had been hit. "The Germans viewed the attacks as catastrophic."

The attack on the synthetic oil plants cost Germany also its synthetic nitrogen and methanol supply and a considerable part of its rubber supply. The nitrogen was indispensable in the manufacture of explosives, and also in fertilizer to produce essential food. Methanol was needed for TNT, hexogen and other high explosives.

"The attack on transportation was the decisive blow that completely disorganized the German economy," the Survey reveals. "It reduced war production in all categories and made it difficult to move what was produced to the front. The attack also limited the tactical mobility of the German army."

Germany entered the war with an excellent railway system. It was generally adequate for the demands placed upon it until the spring of 1944. The heavy attacks in September and October 1944 on marshalling yards, bridges, lines, and on train movements, produced a serious disruption in traffic over all of western Germany.

Science News Letter, November 10, 1945

Boron, a little-known but common non-metallic element, may be used to increase the hardness of steel and is used in certain alloy steels during the war scarcity of chromium, nickel and manganese.

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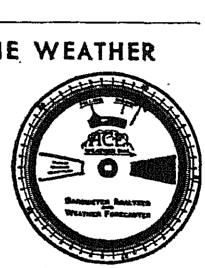

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• Books of the Week •

➤ AERIAL NAVIGATION students will find much of value in AIR NAVIGATOR, by Charles Mattingly. It is primarily a training text for instructional purposes, and a reference source for professional navigators. (*Ziff-Davis*, $6.)

Science News Letter, November 10, 1945

➤ THE DOZEN years that have elapsed between the publication of the first edition of A. S. Romer's VERTEBRATE PALEONTOLOGY and the appearance now of the second have seen very great progress in the particular field of science covered by this book. With the numerous revisions necessarily incorporated, it is practically a new work, and more valuable than ever to the student. (*Univ. of Chicago Press*, $7.50.)

Science News Letter, November 10, 1945

➤ DESPITE much good writing to the contrary, "germs" still connote "disease" to too many people. MICROBES OF MERIT, by Otto Rahn, tells in lively and entertaining fashion (but without distorting the facts) the story of bacteria as ripeners of food, promoters of industrial processes, capturers of nitrogen and general improvers of the soil through beneficial decay. Anyone who dreads all germs as he hates all snakes should have this book presented to him—and a promise to read it exacted from him. (*Cattell*, $4.)

Science News Letter, November 10, 1945

➤ FRANS VERDOORN, that indefatigable Dutch botanist who has become an outstanding American scientific publisher, again makes scientists of two continents his debtors with his compilation of papers from several score authors into one solid, informative volume, PLANTS AND PLANT SCIENCE IN LATIN AMERICA. Some of the material has been previously published elsewhere, notably in *Chronica Botanica*, but much appears here for the first time. The book should be a solid help in making good neighbors into better-understanding neighbors. (*Chronica Botanica Co.*, $6.)

Science News Letter, November 10, 1945

➤ WITH ALL THE WORLD apprehensive of hunger in the coming months, WORLD GRAIN REVIEW AND OUTLOOK, 1945, by Helen C. Farnsworth and V. P. Timoshenko becomes a particularly timely book. The statistical appendix by Rosamond H. Peirce gives much valuable information in little space. (*Food Res. Inst.*, $3.)

Science News Letter, November 10, 1945

• Just Off the Press •

AMERICAN PETROLEUM REFINING—H. S. Bell—*Van Nostrand*, 619 p., illus., $7.50 Third ed., revised and enlarged.

AMERICAN RED CROSS FIRST AID TEXTBOOK—*Blakiston*—254 p., paper, illus., 60 cents. Revised ed. Prepared by the American Red Cross for the instruction of First Aid Classes. (See p. 296)

AVIATION: What Everyone Should Know—Devon Francis—*Bobbs-Merrill*, 229 p., illus., $2.50. What Everyone Should Know series.

BIG DISTANCE—Donald Hough and Elliott Arnold—*Duell*, 255 p., illus., $3. The story of the fighting AAF in the South and Southwest Pacific from the days when we were beaten in the Philippines to the day when American forces came back in triumph.

ENKI AND NINHURSAG: A Sumerian "Paradise" Myth—Samuel N. Kramer—*Amer. Schools of Oriental Research*, paper, 40 p., illus., 75 cents. Bulletin of the American Schools of Oriental Research, Supplementary Studies, no. 1.

GENERAL AND PLASTIC SURGERY, With Emphasis on War Injuries—J. Eastman Sheehan—*Hoeber*, 345 p., illus., $6.75. A reference book on modern operative methods.

HANDBOOK OF KNOTS—Raoul Graumont—*Cornell Maritime Press*, 194 p., illus., $1.75. Illustrates and explains each of 428 knots and ties in detail.

HIGHWAY RESEARCH BOARD: Proceedings of the Twenty-fourth Annual Meeting—Roy W. Crum and Fred Burggraf, eds.—*National Research Council*, 543 p., illus., $5.

MEN, MIND, AND POWER—David Abrahamsen—*Columbia Univ. Press*, 155 p., $2. An analysis of the mentality of a maladjusted German people and its leaders.

PHYSICAL CHEMISTRY OF CELLS AND TISSUES—Rudolf Hober and others—*Blakiston*, 676 p., illus., $9.

PLASTICS: What Everyone Should Know—Bernard Wolfe—*Bobbs-Merrill*, 189 p., illus., $2.50. What Everyone Should Know series.

A STUDY OF THE FISHES OF THE SOUTHERN PIEDMONT AND COASTAL PLAIN—Henry W. Fowler—*Acad. of Natural Sciences*, paper, 450 p., illus., $7.50. Monograph No. 7.

TOWARD IMPROVING PH.D. PROGRAMS—Ernest V. Hollis—*Amer. Council on Education*, 204 p., $2.50. Prepared for the Commission on Teacher Education.

URANIUM AND ATOMIC POWER—Jack De Ment and H. C. Drake—*Chemical Pub. Co.*, 343 p., illus., $4. With appendix on the atomic bomb.

VAPOR ADSORPTION: Industrial Applications and Competing Processes—Edward Ledoux—*Chem. Pub. Co.*, 360 p., illus., $8.50. Foreword by Donald F. Othmer.

Science News Letter, November 10, 1945

INVENTION

Faster Roller Makes Smoother Sheet Glass

➤ SMOOTHER sheet glass is produced by the relatively simple expedient of spinning one of the rollers that flattens the still-soft mass so fast that it carries a film of air on its surface and thereby is kept from direct contact with the hot glass, in the invention on which Dr. Manson L. Devol of Wilkinsburg, Pa., obtained patent 2,387,886. Direct contact with the soft, hot glass, Dr. Devol explains, changes the shape of the roller and in time erodes its surface. Protecting the roller with an air film obviates this cause of poor glass surfaces. Rights in the patent have been assigned to the Pittsburgh Plate Glass Company.

Science News Letter, November 10, 1945

CHEMISTRY

Fire-Resistant Lacquer Adds Structural Strength

➤ NEW AIRCRAFT lacquer, that will not support combustion when used on fabric-covered planes, acts as a tautening agent and adds measurable structural strength as the covering tightens around the airframe, it is claimed.

The new material is now in production at the plant of the Monsanto Chemical Company in Everett, Mass. In addition to these properties, it combines increased weather resistance with ease of application. It is sprayed on at ordinary room temperature. Its fire-resistant property is an asset when used on the interior walls of a plane.

Science News Letter, November 10, 1945

Commercial *sponges* grow in the Mediterranean and Red Seas and in the waters off Florida and the West Indies.

Whooping cough is second among infectious and parasitic diseases as a cause of death in young children.

The *Columbia River* is the finest supply of pure cold river water in this country.

Trees in certain German forests now have little value for lumber because of the large quantities of steel fragments embedded in them.

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•New Machines and Gadgets•

⚙ *ELECTRIC HEATER, to keep drinking trough for cattle free of ice during freezing weather, is a hollow metal disk encircled by a heating element similar to those on electric stoves. A cable attaches it to the barn lighting current. It will neither shock nor burn a cow's nose.*

Science News Letter, November 10, 1945

⚙ *SPECIAL BURNER, developed to disperse fog on airfields, uses Diesel oil instead of aviation gasoline as used in the English system, the first airfield fog dispersal scheme devised. Burner operation is regulated electrically from the control tower.*

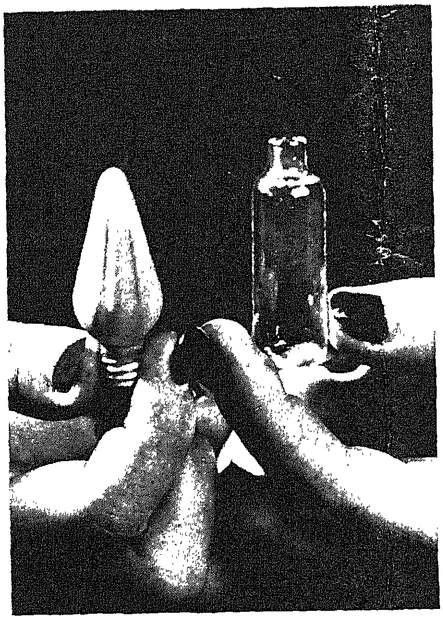
Science News Letter, November 10, 1945

⚙ *SMALL SCREW JACK operated by electric motor is used on heavy aircraft to raise and lower the horizontal stabilizers. It replaces the cable arrangement between trim-tabs on the trailing edges of elevator surfaces and the pilot. The assembly, complete with motor, weighs 22 pounds.*

Science News Letter, November 10, 1945

⚙ *TINY dry battery cells, 36 of which weigh a pound, provide as much service, cell for cell, as standard flashlight cells. The core of each is rolled zinc and paper tape, specially impregnated, plus a mixture of mercuric oxide and carbon. A surrounding steel jacket serves as the positive terminal.*

Science News Letter, November 10, 1945



⚙ *ACID-FILLED vial, or glass ampoule, is a basic part of a new type fuse for shells used by anti-aircraft guns. Its actual construction and operation is still a military secret. As shown in the picture, the ampoule is about the size of an ordinary Christmas tree lamp.*

Science News Letter, November 10, 1945

⚙ *PRESSURE-PROOF camera and equipment, that can be used 225 feet under water to photograph sunken ships and other objects, is an electrically-operated multiple exposure instrument and can be operated from the surface by remote control. It uses standard film, filters and flashbulbs.*

Science News Letter, November 10, 1945

⚙ *NEW DEVICE, called a ram pacer, is attached to a standard hydraulic testing machine used to test metals, plastics and wood where loads must be applied at exact speeds. It gives exact control at one of eight pre-set speeds by gear changes on a synchronous motor drive unit.*

Science News Letter, November 10, 1945

⚙ *ELECTRICAL device to correlate fluctuations in light intensity and time in making exposures for photo engravings goes by the trade name of Totalux. An ultraviolet sensitive photo tube, which passes current proportional to the intensity of the light, is the heart of the instrument.*

Science News Letter, November 10, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 284.*

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Question Box

AERONAUTICS

How have aerial attacks on Germany been evaluated? p. 302.

What plane can travel 400 miles an hour? p. 299.

CHEMISTRY

How soon will synthetic caffeine be produced domestically? p. 297.

Why is the use of 1080 restricted to professionals? p. 297.

ELECTRONICS

How did buoys locate Nazi submarines? p. 292.

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MEDICINE

What diet has been found beneficial to some high blood pressure patients? p. 293.

What new treatment for cirrhosis of the liver is offered? p. 296.

PATHOLOGY

What uninvited fatal infection have guinea pigs now developed? p. 296.

PHYSICS

What enables blind people to locate obstacles within a radius of 20 feet? p. 294.

ZOOLOGY

What toad has no warts, eyelids or tongue? p. 295.

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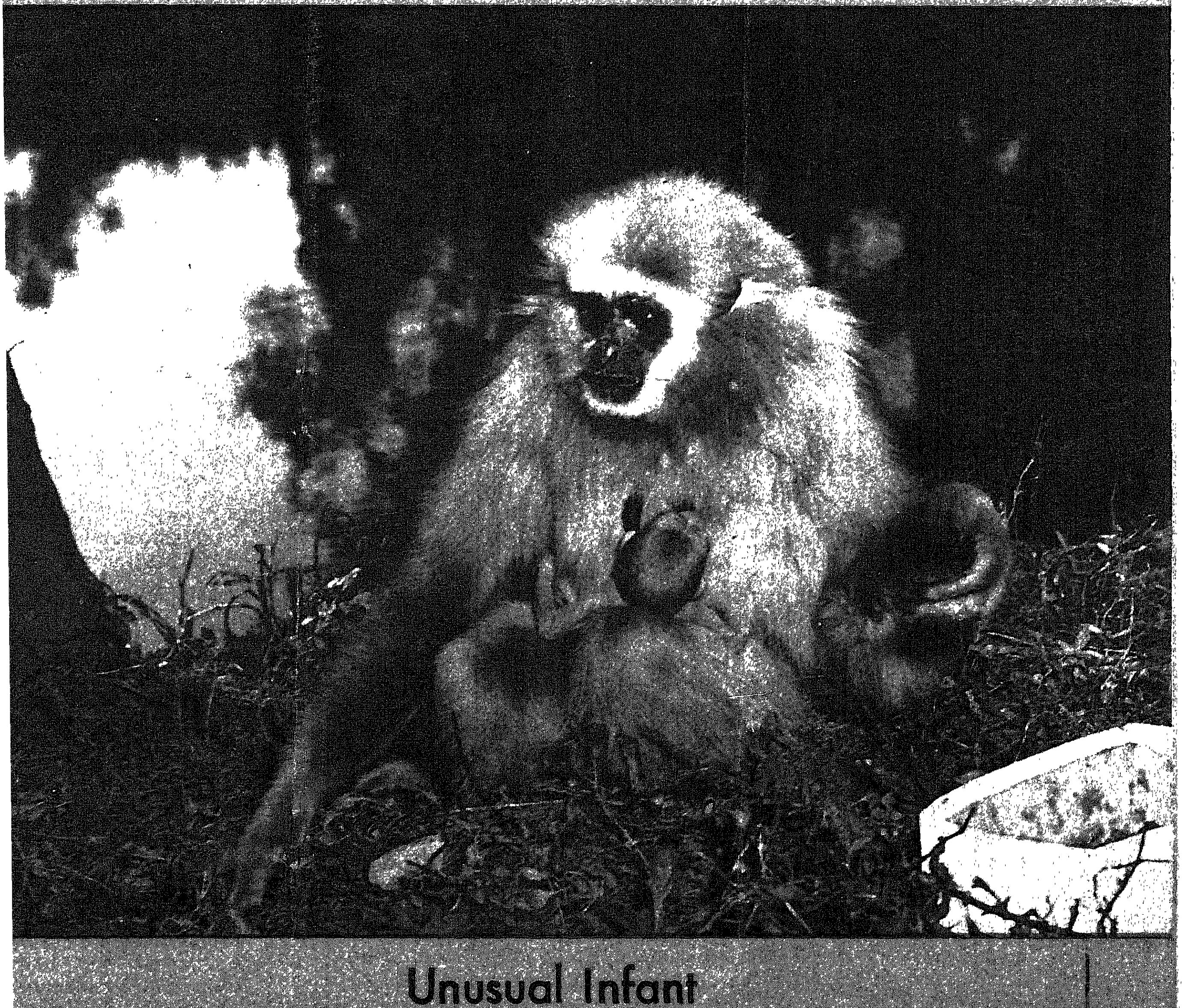

Unusual Infant

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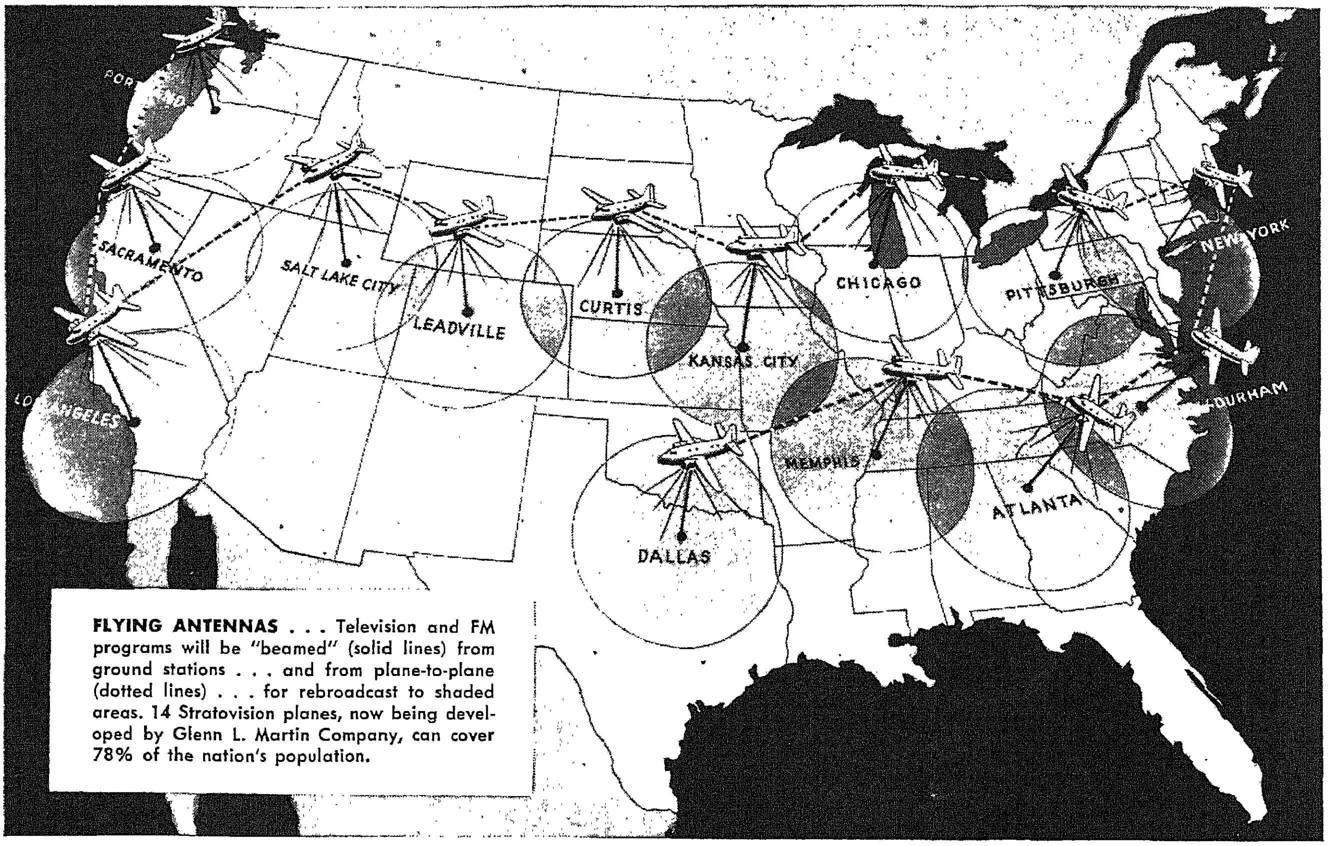


FLYING ANTENNAS . . . Television and FM programs will be "beamed" (solid lines) from ground stations . . . and from plane-to-plane (dotted lines) . . . for rebroadcast to shaded areas. 14 Stratovision planes, now being developed by Glenn L. Martin Company, can cover 78% of the nation's population.

How Westinghouse STRATOVISION took the final headache out of Television and FM

EVEN before the war ended, Television and FM transmitting and receiving equipment had reached a high degree of perfection. But a final difficulty remained—the problem of broadcasting such programs on a *nationwide basis.*

Because of the ultra-high frequencies employed, Television and FM waves travel only in straight, "line-of-sight" direction. They do not *bend* around the earth's surface . . . as do those of standard-band radio.

This limits the range of a Television or FM station to a *maximum of 50 miles*—even when perched atop the tallest building.

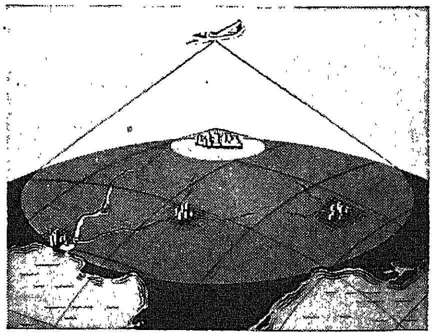
A chain of radio-relay stations across the country—or coaxial cables spanning the nation—have been proposed as a solution. But these are terrifically expensive and, worse yet, cause serious distortion of long distance programs.

Now, at last, Westinghouse research engineers have discovered a practical solution—"STRATOVISION"—broadcasting Television and FM programs from *planes flying six miles high in the stratosphere!*

At this altitude, a single Stratovision plane can cover an area 422 miles in diameter . . . 103,000 square miles . . . approximately the combined area of New York, New Jersey and Pennsylvania.

Westinghouse engineers predict that 14 of these flying broadcasting stations can transmit 4 Television and 5 FM programs simultaneously to *78% of the nation's population.*

The conception and planning of Stratovision broadcasting are a tribute to the ingenuity and engineering "know-how" of Westinghouse radio technicians . . . gained through producing approximately $400,000,000 worth of Radar and radio equipment for our armed forces.



HERE'S THE SECRET . . . Stratovision broadcasting, serving an area of 103,000 square miles, will require only *1/50th as much power* as a 50 kilowatt ground transmitter covering only 7,900 square miles. That's why a *single Stratovision plane* can easily carry and power the equipment needed for simultaneously transmitting 4 Television and 5 FM programs.

Westinghouse
PLANTS IN 25 CITIES OFFICES EVERYWHERE

Tune in: JOHN CHARLES THOMAS—Sunday, 2:30 pm, EST, NBC.
TED MALONE—Monday through Friday, 11:45 am, EST, American Network

GENERAL SCIENCE

Intellectual Freedom

This should be guaranteed but no attempt made to solve problem of military information security, London conference proposes.

By VICTOR COFMAN

Cabled from London

➤ INTELLECTUAL freedom would be guaranteed but no attempt would be made to solve the problems related to security of military information, if proposals made by Archibald MacLeish, chairman of the U. S. delegation to the United Nations conference for the establishment of world educational and cultural organizations are adopted.

This suggestion has relationship to the problems raised by the atomic bomb development and the restrictions for military reasons placed upon the announcement of results of scientific research.

Mr. MacLeish's idea seems to be that the international organization would first tackle the job of free speech and free press in the broad cultural field rather than try to solve a complex situation that is a special part of the larger problem.

British scientists are insisting that the word scientific be inserted in the title of the proposed organization and this viewpoint was presented and supported by Britain's Minister of Education Helen Wilkinson. This viewpoint is understood to have insistent support among American scientists also.

Scientists among the 300 delegates from 43 nations include: Nobelist J. F. Joliot and Dr. Pierre Auger, physicists of France; Dr. Charles Armstrong, British chemist; Dr. H. R. Kruyt, Dutch chemist; Dr. Olaf Devik, Norwegian physicist, and Dr. Ellen Gladitsch, Norwegian chemist. Dr. Harlow Shapley, Harvard astronomer, the scientist upon the American delegation, joined the conference about Nov. 10.

Interim Commission

➤ THE formation of an interim educational, scientific and cultural commission, consisting of the representatives of 15 governments, to bridge over the gap until a United Nations Educational, Scientific and Cultural Organization is fully established has been suggested by the United States delegation to the organization meeting of the UNESCO here.

Another interim commission to examine the problem of controlling atomic research was proposed by the Belgian representatives. Prof. G. Magnel, civil engineer from the University of Ghent, told me that the Belgian proposal would involve the inspection of all nuclear research laboratories by an inspection service to be set up by each government, which would then report its findings yearly to UNESCO.

Two Alternates

➤ LIVING deep underground or the complete dispersal of our population into small, widely separated villages is the only alternative to the immediate abolition of secret diplomacy and the control of atomic bomb manufacture under international authority. This is the opinion of Prof. Marcus Laurence Oliphant, British physicist who participated in the making of the atomic bomb.

Any secrets in the manufacture of the atomic bomb cannot be kept more than six months, Prof. Oliphant warned.

No scientific knowledge should or can be kept secret, resolutions of the conference of the World Unity Movement and the Council for World Airways recited after the meeting had heard from three members of the Royal Society, Sir Leonard Hill, Prof. Launcelot Hogben and Dr. Kathleen Lonsdale.

Development of atomic energy without delay and subject to international control was recommended, and the cooperation of scientists was advised to devise the best means to exploit its use under a world authority solely and fully in the interests of the world community.

Science News Letter, November 17, 1945

GETS NEW POST—Dr. Edward U. Condon, one of the country's atomic bomb experts, is now the new director of the Commerce Department's Bureau of Standards. He succeeds Dr. Lyman Briggs, retiring director. Photograph by Fremont Davis, Science Service staff photographer.

PHYSICS

Betatron X-Ray Machine Ready for Industrial Uses

➤ PUSH-BUTTON controlled betatron machines, that generate 20,000,000 volt X-rays, are ready for industrial use, Gail D. Adams, Jr., of the University of Illinois physics department, told the Marquette University's radiography symposium in Milwaukee.

Perfected in secret during the war, the betatron was invented by Prof. Donald W. Kerst of the University of Illinois and now a commercial model has been made for industry and medicine.

The 20,000,000 volt machine makes X-ray pictures through 20 inches of steel in 1½ hours, shows up flaws as small as 1/32 inch, produces images enlarged to three times size, and produces sharply defined photographs because of the pin-point source of the X-rays.

The commercial model is arranged for simple, inexpert operation and takes a space only five feet long, three feet high and two feet thick.

The betatron operates by accelerating electrons, the light-weight satellite particles of an atom, to a speed approaching the speed of light.

Electrons are injected into the doughnut-shaped vacuum tube and are speeded by the rising phase of an alternating current in the magnet.

They spin around inside the tube, gaining 70 volts energy at each of 300,000 revolutions, are deflected from their orbit to strike the pin-point target which gives off 20,000,000 volt X-rays.

The concentrated beam from this point has been calculated to equal the radiation from at least 5,000 grams of radium.

Science News Letter, November 17, 1945

ASTRONOMY

Rings Around Double Stars

Discovery of gaseous rings surrounding some suns may bring us closer to solving the riddle of how multiple stars and dark planets are created.

By DR. OTTO STRUVE

Director, Yerkes and McDonald Observatories

➤ MANY double stars, those enormous suns that whirl around each other at incredible speeds, are surrounded by rings of flaming gases. Discovery within the past few weeks of several new double stars of this type may bring us closer to solving the riddle of how multiple stars and dark planets are created. One or both of the rotating suns in double stars such as AQ Pegasi, in the constellation of Pegasus, the Winged Horse, and VW Cygni, in the constellation of the Swan, are encircled by tenuous rings of fiery gases. Half-a-dozen such stars have recently been found by observers at the McDonald Observatory of the University of Texas, operated jointly by the Universities of Texas, Chicago and Indiana.

In all the twin stars with rings thus far observed, the flaming rings of gases have been found to rotate very rapidly in the direction in which the two suns themselves revolve. Since the component stars at present do not rotate exceptionally rapidly around their axes, it seems probable that the rings, which move much more rapidly, were formed early in the history of each system.

These rings, which might be compared to the rings surrounding the planet Saturn, were probably created when the rotation of the star was great enough to make the system unstable. They possibly came into being at the time the star split to form a two-star system.

Usually the thin rings, with diameters two or three times the diameters of the stars themselves, are located midway between the two poles, in the equatorial plane of the rotating star. In most cases the presence of these rings, far too small to be seen even with the largest telescope, is detected by bright radiations of hydrogen and sometimes of other gases found in the star's spectrum.

Once in a while we find a star whose equator happens to lie exactly in the line of our sight so we get an edge-on view of the ring. In such a case we observe the light of the star shining through the gases composing the ring. This makes it possible to learn some of the secrets of these Saturn-like stars by examining the dark lines which appear in the spectrum.

Thinking of the rings of Saturn may make clearer the way we study these stars. When the rings are open, they are seen projected mostly upon the background of the sky. If the rings were gaseous (which the rings of Saturn are not) they would then give bright lines in the spectrum. But sometimes the rings of Saturn are seen edgewise, and are then mostly projected upon the disk of the planet. In such a position a ring of gas would produce in the spectrum dark lines in the position characteristic of the bright lines belonging to the gas.

Some of the close binary systems consist of two suns revolving around one another, almost in contact, taking from a few hours to many days to complete one rotation. Frequently these double stars are surrounded by tenuous rings, while sometimes only one of the two revolving suns has a ring around it.

When the ring surrounds only one sun in a binary system, we have a good opportunity to test our theory concerning these gaseous rings. Once in every revolution the star in front eclipses the star behind it. But just before the more distant star is hidden, the star in front passes over one side of the ring and eclipses it. Immediately after the eclipse it covers up the other side of the ring. When one or the other side of the ring is eclipsed, the violet and red components of the bright lines of hydrogen disappear from the spectrum.

The use of the spectograph in detecting the presence of rings was suggested by the late Dr. Arthur B. Wyse of the Lick Observatory and was then correctly interpreted by Dr. Alfred H. Joy of the Mount Wilson Observatory.

In the course of some ten years we have observed the appearance of new rings around single, rapidly-rotating stars, and have also seen the rings gradually disappear. They seem to be quite unstable and rapidly dissolve into space.

It seems probable that these rings, only rarely present in single stars, are frequently present in two-star systems. Even when we do not see them, they are almost certainly present because in most of the systems the angle at which we see the rings is not suitable for producing and observing the bright lines in the spectrum.

Science News Letter, November 17, 1945

A *fuel* somewhere between kerosene and gasoline has been developed for jet-propelled planes.

The *coco palm* provides food, drink, clothing and shelter; from the coconut shell, combs, spoons, bowls and ornaments are made.

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MEDICINE

Chemical War on Allergy

Ethylene disulphonate injected into hayfever, asthma, migraine and other allergic sufferers relieved most or all of the symptoms.

➤ GOOD results with a chemical attack on hayfever, asthma, migraine and other allergic conditions were reported by Dr. W. Merritt Ketcham, of Kansas City, Mo., at the meeting in Cincinnati of the Southern Medical Association.

After one to six injections of the chemical, ethylene disulphonate, patients were relieved of most or all of their symptoms and have remained well for the six to 18 months since the treatment was given.

The idea for this chemical attack on hayfever and kindred ailments was developed by a group of British and Belgian scientists. They believed from their studies that the primary cause of allergy was a "department from normal in the chemistry of cellular metabolism involving the absence of certain catalysts of co-enzyme activity."

Shock, either emotional or as a result of infection or injury, would cause the abnormality in cell chemistry in persons whose body cells had inherited a tendency to react in such a way to the shock.

Giving the allergic patient a catalyst chemical which would restore the "normal oxidation chain involved in the production and normal distribution of cell energy" would be the suitable treatment, the scientists reasoned. They suggested that the missing catalyst would be a short carbon chain compound having two or more unsaturated carbon linkages. A number of such chemicals were produced, of which the most satisfactory seems to be ethylene disulphonate. It is not believed that this is the catalyst missing from the body in allergy but it helps the patients as if it were.

Dr. Ketcham has used it in some 200 cases during the past three years. One woman suffered from migraine for 18 years. During the past 18 months she was in bed two and three days of each week, losing five and six pounds during the 48 to 72 hours of headache. After six injections of diethylene sulphonate between April and October, she has been free of headache for a year except for one soon after the last injection, has gained 17 pounds and feels better than in years past.

Patients with year-round hayfever seldom get 100% relief, but most of them report 50 to 75% improvement. Dr. Ketcham believes, from results with those first treated, that in another year or two the improvement in these patients will be more marked.

Those with food allergy are able to eat almost anything without trouble and all are in better health. Asthma patients are relieved of their symptoms, gain weight and are able to get over a cold or sinus infection without having an attack of asthma.

Some patients may in future have relapses and it is always possible, Dr. Ketcham pointed out, that conditions which started the allergy may occur again and reestablish an allergic state.

Besides his own experience with ethylene disulphonate, Dr. Ketcham referred to reports of other physicians who have treated many hundreds of patients with the same satisfactory results.

Ethylene disulphonate is made by the Spicer-Gerhart Company in Pasadena, Calif., but is available only to physicians for clinical research.

Science News Letter, November 17, 1945

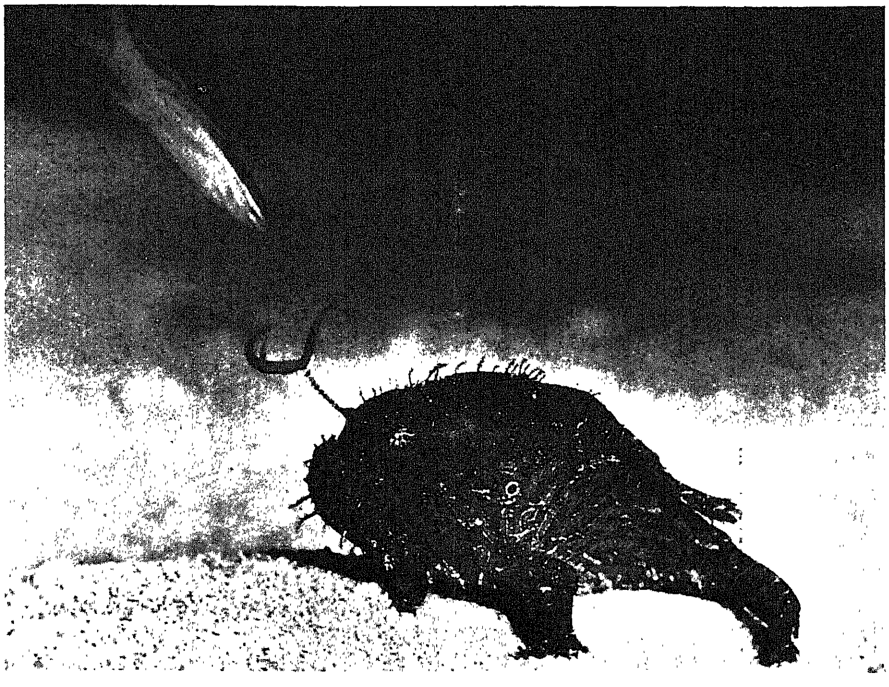
PHYSICS

Smyth Report Reprinted By British Publisher

➤ THE SMYTH report on atomic energy, which is the authorized detailed story of the development that led to the atomic bomb, has been reprinted in a 10,000-edition by His Majesty's Stationery Office, the official British government agency corresponding to the U. S. Government Printing Office which prints U. S. official publications.

About ten such U. S. documents have been reprinted similarly, including the official radar report. The American Library in London, which is a function of the Department of State, acts as professional adviser to the HMSO in this connection.

Science News Letter, November 17, 1945



GOES MAN ONE BETTER—The frogfish is never without his rod and worm-like "bait." The lure is a perfect imitation of a wriggling grayish-white worm, points out Dr. William Beebe of the New York Zoological Park. When the prey is about two inches away, the great mouth of the angler opens, creating an irresistible current. Having swallowed his prey, he lays the lure back on his head, ready for use when he is hungry again, and spreads all his fins, Dr. E. W. Gudger of the American Museum of Natural History reports.

ASTRONOMY-METEOROLOGY

"Controls" the Weather

Changes in the sun's radiation may affect the earth's weather indirectly through variations in the thickness of "E" layer in outer atmosphere.

➤ WEATHER changes on earth may be indirectly controlled by changes in the sun's radiation, through variations in the thickness of the radio-wave-reflecting "E" layer of the earth's outer atmosphere. A close correlation between thickness changes in this layer and shifts in the weather has been found by Dr. Charles G. Abbot, research associate of the Smithsonian Institution, in a study of records extending over seven years.

Dr. Abbot has for many years followed the apparent connection between the weather and the solar constant, or total radiant energy received from the sun, as recorded daily at Smithsonian observatories in California, New Mexico and Chile. Changes in the solar constant are small and difficult to make at best—impossible under bad weather conditions. "E" layer thickness variations, on the other hand, are easier to measure and observations are not affected by weather. These thickness variations are also measured daily, by observers of the Carnegie Institution of Washington; the best records are those kept by the Carnegie stations at Huancayo, Peru, and Watheroo, Australia.

"It is clear," states Dr. Abbot, "that the sun's variations are a major factor in weather. The effects produced are large. In Washington temperatures it makes nearly 20 degrees Fahrenheit of difference in some months whether the solar constant rose or fell by three-fourths of one percent a week or more previously. The effects are long continuing. They appear to begin three days before measurable changes in radiation occur, and to last at least until 14 days after, making an important sequence of at least 17 days in weather, attending each change of solar radiation.

"It appears that approximate predictions a week in advance could be made of dates of peaks and troughs of Washington temperature if daily reports of the 'E' layer were obtained from a sufficient number of ionization stations, and if means could be found to anticipate by a few days closely the date of the next approaching solar change. Its sign would always be known to be opposite to that last observed. From present records we should expect solar changes of the same sign to follow each other at intervals of about nine days, with changes of opposite sign intervening. There is, I think, a fair hope that such important dates as heavy frosts may become predictable a week in advance from solar observations by this method."

Science News Letter, November 17, 1945

GENERAL SCIENCE

Many Russian Scientists

The USSR has trained 3,900 for doctor's degree since 1937; 11,543 doctor's degrees in science were granted in the United States for the same period.

➤ IN SOVIET RUSSIA, 3,900 scientists were graduated from the colleges with the degree of doctor in the years 1937 to 1944; about 20,000 received a master's degree, according to Joseph Agroskin, vice-chairman of the Committee on Higher Education in Moscow.

The Soviet Government has been paying particular attention to the matter of training scientists, Vice-Chairman Agroskin said, because of the pressing need for teachers of technical subjects in the colleges due to a greatly increased student body.

In 1929, there were only 26,000 engineers with diplomas in all the heavy industries of Russia. But in the last six years, about 80,000 engineers were graduated.

In pre-revolutionary Russia, Vice-Chairman Agroskin said, higher education was for the privileged few of the upper strata. In 1914, Russia had only 91 colleges with 112,000 students. The Soviet Government placed the entire system of higher education on new principles. Nationality and class distinctions were abolished. Education was free. All nationalities were permitted to teach in their own languages in colleges on the territory of their own national republics. Both universities and institutes were opened to all working people.

As a result, there are now 772 colleges with 562,000 students. Of these 132 are industrial institutes, 18 transport institutes, 87 agricultural institutes, 68 medical institutes, 115 pedagogical colleges and 29 universities.

In 1925, Vice-Chairman Agroskin reported, there were only 17,900 professors and lecturers in all Russia's colleges. Now there are 40,000.

More in U. S.

➤ IN the United States, about three times as many doctor's degrees are granted to graduate students of science as those reported granted in Soviet Russia, according to an estimate based on figures appearing in the *"Science, The Endless Frontier"* report to the President by Dr. Vannevar Bush, director of the Office of Scientific Research and Development.

In the United States, according to the Bush report, an average of 1,649 doctor's degrees in the sciences were granted annually for the prewar years 1935-1940. This would mean about 11,543 for a period comparable to the seven years reported by Vice-Chairman Agroskin from Russia during which 3,900 scientific doctorates were granted in that country. The population of Russia is, however, much larger than that of the U. S.

Although the war will probably mean a drop in the number of candidates for the doctor's degree, the peak of this deficit is not expected to be felt until several years after the war when there will be fewer college graduates ready to enter training for advanced degrees.

Science News Letter, November 17, 1945

MEDICINE

Small Defects in Skull Repaired by Wire Mesh

➤ THE patient who has lost a small piece of skull, either because of disease or injury, may have it replaced with a wire mesh of stainless steel if his surgeon follows a method developed by Dr. Edwin B. Boldrey of the University of California Medical School in San Francisco. Announcement of the development has been made through the University.

The wire screen, Dr. Boldrey found,

is tolerated well by the body and is superior, he believes, to small bone grafts or bone dust previously used for filling small cavities in the skull. It is suitable for defects up to one and one-half inches in diameter. It might be used following operations for removal of a small brain tumor, drainage of a brain abscess and repair of a depressed fracture of the skull.

No ill effects of any kind have followed use of the wire mesh during the past eighteen months.

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GEOLOGY

Norwegian Geologists Will Study Rock Records

➤ RETURN of science in Norway to normal conditions is signalized by arrangements now being made for a geological research expedition into a high mountain area in the central part of the country, to study records left in the rocks and soil by the waning remnants of the last great Ice Age glacier. A communication to this effect has been received by the Geological Society of America from Dr. Kaare Munster Strom, president of the Geological Society of Norway.

The expedition, which will be in the field from about June 25 to July 5, will be under Dr. Strom's leadership. The size of the party will have to be limited because of lack of shelter in the rugged mountain country, but two or three American geologists may be included.

Science News Letter, November 17, 1945

INVENTION

Superheated Steam For Roasting Coffee

➤ USE of superheated steam for roasting coffee instead of the conventional dry roasting is advocated in patent 2,388,298, taken out by T. J. Stephens of New York City. The coffee grains are slowly poured into one end of a slowly rotating kiln-like cylinder with a spiral web inside to keep the mass distributed and moving towards the other end. The beans are subjected to the action of superheated steam throughout their course. The inventor claims that this process makes for better flavor, more cups of coffee per pound, and greatly decreased production of harmful unsaturated organic compounds in the roasted beans. He also states that the same process can be used for roasting nuts, grains and other vegetable products.

Science News Letter, November 17, 1945

GENERAL SCIENCE

Scientists Deferred

Those who are under 26 and have done war research for two years may now ask to be allowed to complete study for a science or engineering degree.

➤ YOUNG scientists under 26 years of age who have done research for at least two years on war projects such as the atomic bomb, antimalarial medicines, DDT, or radar may now ask for deferment from the draft in order to complete study for degrees.

No promises are made of deferment by Selective Service. Each case will be handled individually on its merits and must be recommended by an official of the Office of Scientific Research and Development.

This is the first step taken in response to recommendations made last July in a report to the President by Dr. Vannevar Bush, director of the Office of Scientific Research and Development, in which he pointed out the critical shortage of scientists in training to carry on essential research.

The new policy is based on a letter written by Secretary of War Robert P. Patterson to Maj. Gen. Lewis B. Hershey, Director of Selective Service.

This plan, proposed by the Secretary of War, takes care of only a small part of the urgent problem of insuring that the United States have available trained scientists for postwar research needed for industry and an adequate national defense.

It makes no provision for scientists under 26 who already have their Ph.D. degrees, although these men are perhaps the most valuable both for research and for the instruction of scientists in training. It takes at least six years to train high school graduates to research effectiveness.

Nothing is done about the scientists who up until 23 months ago were still in college and who interrupted their training to do war research. The plan only applies to men who have been engaged for two years or more on war research.

No provision is made for deferment of talented 18-year-olds who up until their eighteenth birthday were taking scientific training.

Nothing is done about getting thousands of scientists in our armed forces out of uniform and back into research or scientific training, which was one of the strongest recommendations of the Bush report.

Nothing is done toward getting many scientists in the armed forces back into industry where they are needed for reconversion and development of new products, as advocated by professional organizations such as the American Chemical Society.

Only those scientists who have been engaged on war research for two years or more and who now have been enrolled in a recognized college or university to complete work for a degree in science or engineering are affected. Such individuals, under this plan, may write to George W. Bailey, Office of Scientific Research and Development, 1530 P Street, N.W., Washington, D. C., sending a statement from their employer certifying that they have spent two years or more in war research, a statement from a university or college official that he has been accepted for enrollment, and also a short personal history.

Science News Letter, November 17, 1945

AERONAUTICS

Carrier-Based Plane Goes 500 Miles an Hour

➤ THE BRITISH Navy's announcement of the de Havilland jet-propelled plane, the Vampire, to be used as a carrier-based fighter, indicates a new advance attained by English jet-engine manufacturers.

Looking somewhat like the twin-boomed Lockheed P-38 Lightning, it is said to have a level flight speed of over 500 miles an hour and a ceiling of nearly 50,000 feet. Powered with a single de Havilland Goblin jet engine, which also powered the original Lockheed jet fighter, the P-80 Shooting Star, the Vampire is of all-metal construction and has arresting gear for carrier landings retracting into the exhaust jet cowling.

Another very successful British jet plane, the twin-engined Gloster Meteor, was the only Allied jet fighter to see action in the war, but except for the fact that its speed is in the 500-mile-an-hour class, performance data are still restricted.

Science News Letter, November 17, 1945

ENGINEERING

Deaf People Will See Sounds of Speech

➤ DEAF PEOPLE will some day be able to use the telephone without an interpreter and to enjoy radio programs by seeing the sound patterns of speech, music and the like, it appears from a report by Dr. Ralph K. Potter of the Bell Telephone Laboratories. (*Science,* Nov. 9.)

Several devices for translating sound into visible, easily understood patterns for this purpose have been developed at the laboratories. So far, they are still largely in the experimental stage, but Dr. Potter suggests that in the future a deaf person will be able to carry on a telephone conversation with an apparatus about the size of a portable typewriter, the speech patterns from the party at the other end of the wire appearing on a moving drum of phosphorescent material.

First practical use of the new devices apparently will be in teaching the deaf to speak or, if they already speak, to improve their speech and eliminate unpleasant tones, blurring and the like.

Study of foreign languages, dialects, bird songs and music can be helped by the sound-to-vision translators. Industrial applications are also foreseen.

The apparatus, it is explained, makes use of the fact that speech is fully defined by three qualities: pitch, loudness and tone. Sound at any instant can be analyzed by separating it into a suitable number of pitch groups, and measuring the intensity in each group. When this separating and measuring process is continuous, and the results are exhibited on a moving screen, patterns are formed which to a trained eye reveal not only the words spoken, but even the dialect of the speaker.

Science News Letter, November 17, 1945

ELECTRONICS

ANRAC Aided Navigation During War, Now Released

➤ ANRAC is the newest addition to the now-it-can-be-told family of electronic devices developed during the war that are being put to peacetime uses. ANRAC is a system for turning on and off such aids to navigation as unmanned lighthouses, light buoys, foghorns and electric bell strikers by means of a set of coded radio signals sent out from a central control station. The word was coined from the initials of Aids Navigation Radio Control.

The system was installed by the U. S. Coast Guard at Pearl Harbor, Midway, sections of Alaska and certain islands in the South Pacific, as well as along both coasts of the continental United States, so that navigation aids could be turned on for the benefit of friendly vessels and shut off at other times to deny any involuntary aid to the enemy.

Peacetime uses are expected to be largely in the direction of economies in operation, permitting lights to be turned on and off according to natural lighting conditions, bells and foghorns to be stopped when there is no fog, etc. An added benefit, in the case of foghorns, is the abatement of their nuisance character; residents on foggy coasts become resentful if a foghorn keeps right on with its monotonous, disagreeable sound after the fog has cleared.

Science News Letter, November 17, 1945

CHEMISTRY

Knockout Drops Ingredient In Making DDT

➤ OLD-FASHIONED knockout drops, or chloral hydrate, figured in the original formula for making DDT, the "Mickey Finn" of the insect underworld, states F. C. Bishopp of the U. S. Department of Agriculture. The directions for making DDT, as given in the first British patent, call for mixing chloral hydrate or chloral with chlorobenzene, then adding sulfuric acid.

Science News Letter, November 17, 1945

CHEMISTRY

Iron Compound Makes Stronger Wallboard

➤ STRONGER fiberboard for building purposes can be made with shorter application of heat and pressure if the mass of wood, cane or other fiber is first sprayed with a solution of ferric sulfate or other related iron compound, Harry R. Linzell of Long Lake, Ill., states in his preamble to patent 2,388,487, which has been issued on the process. Patent rights are assigned to the United States Gypsum Company.

The chemistry of the process is still but dimly understood, Mr. Linzell continues, adding that perhaps the ferric salt has some kind of catalytic effect on the self-bonding substances generated in the heat treatment of lignocellulosic fibers. The effect, however, is to make the final product stronger, more workable and less brittle, as well as more water-resistant.

Science News Letter, November 17, 1945

IN SCIEN

PHYSICS

Atom Scientists Federate To Help Congress

➤ THE SCIENTISTS who made the atom bomb, several thousand strong, have banded together as the Federation of Atomic Scientists, welding into one national organization the separate associations that were formed at the atomic research laboratories at Los Alamos, N. M., Clinton, Tenn., Chicago and N. Y.

"Rank and file" scientists from each of these four experimental centers are being sent to Washington in relays to give information to members of Congress and government officials while atomic energy and scientific bills are being considered in Congress.

Representatives from similar groups at Cambridge, Philadelphia, and other localities joined the atomic scientists in a national conference held in Washington, Nov. 16 and 17.

A continuous monopoly of the atomic bomb by the United States is impossible, the atomic scientists have declared. No specific defenses against the disastrous effects of the atomic bomb exist, scientists further state, and no nation can feel secure until the control of atomic power is solved on a world level.

Science News Letter, November 17, 1945

AGRICULTURE

Sugar Shortage Means Less Honey, Too

➤ SWEET-TOOTH folk have another jolt coming to them; not only does the sugar shortage continue, but there will be less honey than anticipated this year.

Actually, there will be more honey this year than there was last, the U. S. Department of Agriculture states, but so much of it will have to be left to feed the bees that the human public's share of amber sweetness will be less than if there were plenty of sugar.

Ordinarily, beekeepers take most of the honey away from their bees and give them a cheaper "ersatz" food in the form of sugar syrup. But when they can't get enough sugar they find it necessary to leave more honey in the hives, to keep the workers alive until spring brings new nectar flowers.

Science News Letter, November 17, 1945

E FIELDS

BIOLOGY-GENETICS

Genes Seen at Work For First Time

➤ WHAT IS believed to be the first instance of genes, or heredity-determining units within a cell, actually being seen at work chemically influencing the course of physiology is reported by two biologists, Dr. J. F. Danielli and Dr. D. G. Catcheside, both of Cambridge University. (*Nature.*)

By means of exceedingly delicate biochemical methods, the two researchers were able to demonstrate a concentration of the enzyme phosphatase in zones or bands on a chromosome, one of the structures within the cell's nulceus credited with being the carriers of groups of genes. These zones of concentration correspond closely with the fixed positions long since assigned to particular heredity-units by geneticists. Phosphatase is an enzyme having to do with the chemical transformations of phosphorus-containing compounds, important in the life-economy of the cell.

Regarding their discovery, Drs. Danielli and Catcheside comment:

"This apparent coincidence between sites of enzyme activity and of genetic activity suggests that we have here an indication of a process whereby genes influence cellular activity, and is, we believe, the first experimental indication of the nature of such processes."

Science News Letter, November 17, 1945

GENERAL SCIENCE

Problem Is to Stop War, Not Curb Science

➤ THE WORLD'S main problem is not to curb science but to stop war, Dr. Raymond B. Fosdick, president of the Rockefeller Foundation, said in a discussion of the atomic bomb and other scientific achievements in relation to the world at large.

In the relations of one government with another, Dr. Fosdick said, law must be substituted for force and international government for anarchy. This is a job in which Dr. Fosdick feels everybody must participate, including the scientists.

"The bomb on Hiroshima suddenly woke us up to the fact that we have very little time," he said. "The hour is late and our work has scarcely begun.

"Can education and tolerance and understanding and creative intelligence run fast enough to keep us abreast with our own mounting capacity to destroy? That is the question which we shall have to answer the one way or the other in this generation. Science must help us in the answer, but the main decision lies within ourselves."

Dr. Fosdick talked over CBS network during a Philharmonic Symphony United States Rubber Company broadcast.

Science News Letter, November 17, 1945

ZOOLOGY

First Baby Gibbon Born At New York Zoo

See Front Cover

➤ THE WHITE-HANDED Gibbon baby, shown with his mother on the cover of this SCIENCE NEWS LETTER, was born on Sept. 10 at the zoo in New York. Two hours of coaxing went into the making of the picture, taken three days after the birth of the baby. Before the birth, the mother showed very little timidity and willingly approached her keeper and photographers.

Gibbons have been bred rarely before, but this is the first for the zoological park in New York. Both of the parents are a soft, café au lait, a variation occurring frequently in the wild state. (Photograph from *The Animal Kingdom.*)

Science News Letter, November 17, 1945

ZOOLOGY

Baby Bats Born with Eyes Wide Open, Report States

➤ "BLIND as a bat" certainly doesn't apply to a litter of young tropical bats whose birth was observed by Dr. T. S. Jones of the Imperial College of Tropical Agriculture at St. Augustine on the island of Trinidad. These young bats came into the world with their eyes wide open, something never hitherto reported in print for any family of bats.

Dr. Jones states, however, that one similar occurrence was reported to him in a private letter from Dr. H. B. Sherman of the University of Florida, for one litter of young of another species of bat.

These zoological rarities are discussed in a communication to the editor of the British scientific journal, *Nature.*

Science News Letter, November 17, 1945

ICHTHYOLOGY

Trout Three Feet Long Found in Peruvian Waters

➤ THE ANSWER to the angler's prayer, for "a trout so big that I, in telling of it afterwards, shall have no need to lie," seems to be in Lake Titicaca, the great freshwater sea high in the Peruvian Andes. Speckled and rainbow trout there, descended from fish eggs brought from the United States by a mining company 20 years ago, are reported to be as much as three feet long, and to give tough tussles to Indian fishermen in their frail reed canoes.

For the first time, eggs are being obtained from the Titicaca trout this year for artificial stocking of other Peruvian waters. Eventually, it is hoped, a commercial trout fishing industry may be developed in the Andean uplands, to aid in the effort to give the population a higher protein ration.

Science News Letter, November 17, 1945

ENTOMOLOGY

German Bee Researcher Continues His Work

➤ GERMANY'S leading student of bees and their ways, Prof. Karl von Frisch of Munich, well known the world over in pre-Nazi days for his researches on the "language" of bees, is still carrying on as well as he can, despite past misfortunes and present hardships, states Prof. Arthur D. Hasler of the University of Wisconsin. (*Science,* Oct. 26)

Because of his outstanding work, Prof. von Frisch had been provided with a building and special equipment by the Rockefeller Foundation. This has been badly bombed; only the basement and first story remain. Prof. von Frisch had removed the special library to his own home, thinking that the residence districts of Munich would not be bombed; nevertheless, his house and the library were destroyed. And all the time, both before and during the war, he was subjected to constant hazing by the Nazis because one of his grandmothers was a "non-Aryan."

Prof. Hasler states that this case is typical of the plight of many another non-Nazi German scientist. He adds, "It is my opinion that those who have acquaintances in Germany would do science, and, may I venture, world peace a great service by sending them a word of encouragement or perhaps some reprints or warm clothing."

Science News Letter, November 17, 1945

GENERAL SCIENCE

For These Things, Thanks

For the end of killing, for atomic power, albumin, globulins, streptomycin, DDT, ANTU, and for the opportunity for confidence and understanding.

By WATSON DAVIS

➤FOR THE END of killing, thanks. For the lifting of the gnawing fear of sudden death for ones loved, thanks. Stresses of world-wide war fade into conflicts of peace. Thanks, too, for this.

May 8 . . . Aug. 14.

Out of the dead and wounded past comes future hope. Costly offense to fend our ways brings ways to bright new worlds; weapons of war wrought into shares of well-being.

Pearl Harbor . . . Nagasaki.

War is blood-letting. Millions at home gave their Red Cross blood that soldiers might be unshocked. Plasma, clear life-fluid, powdered and then reconstituted on the battlefields, countered the clawings of high explosive shells.

By-products of plasma—by-products of war—came out of the laboratory to minister to ailing people. A blood fraction prevents measles, another makes a plastic that, because it is part of the body, covers surgeon's woundings and returns to the body. A substance to make blood-typing quicker and surer. Future medical riches from the good red blood. Some use for the red blood cells, and protectors against other ills.

Albumin . . . fibrin . . . globulins.

Propellers that fan give way to jets that spurt. Puffs and streams of exploding gases thrust new aircraft at speeds that rival the swift travel of sound. Seven hundred miles an hour plus brings tussle of flight with reluctant air. Compressibility puts up a barrier that research will thrust aside by sleeker, smoother, aerodynamically cleverer wings. New foils will foil the momentary pause in aeronautics ever faster, faster. Despair-born V-1, V-2, sudden death in each explosion, to those unborn are mere models for some useful rocket, bearing mail, probing weather aloft, or whisking human cargo through the stratosphere.

P-80 . . . P?

Bigger, longer armed, higher reaching, more heavily burdened B-29s and all their bomber ilk are prototypes of peaceful ships to drop new commerce and mutual exchanges of trade and culture upon our neighbors half around the globe. Air paths war-blazoned around the earth, with smooth, hard landing ribbons in arctic wastes and tropic jungles, are breathing and refresher spots in the airlanes to a united world. We have talked of one world; these are the ties to compress our sphere to threescore hours.

USAAF . . . ATC.

Gold is yellow. So is the lowly mold that gives up the penicillin drug that outcures even the marvelous sulfa family of chemicals. More precious than gold ever was or ever will be is this mold chemical, mass-produced in giant factories with priorities as high as explosives, or bombers, or atom bombs—almost. Good from the evil of war, this antibiotic of great value, worth to the future some of the suffering of the recent past—almost.

Syphilis treated in a mere nine days. Gonorrhea conquered and non-infective in one single day. Deadly pneumonias laid low in hours. Were these not modern medicine they would be miracles. Thousands willing to let their blood be tested now that cures are speedy, sure. In the hopeful glassware of experimental laboratories other growths of other fungi give hints of conquests to come. And new chemicals with promise for attacking other diseases.

Streptomycin . . . Promin.

Greatest flying foe in the early stages of island hopping toward Tokyo and the yellow heart of Japan was not bomber Mitsubishi or pursuit Zero. Rather it was malarial plasmodium carried by Anopheles, mosquitoes to you. Quinine was preclusively captured by the Japanese overrunning of the East Indies. Out of the other Axis enemy, Germany, came a chemical substitute, atabrin, as good or better than the time-honored quinine. U. S. perfected and produced, this chemical, becoming as G. I. as K rations, outfought malaria. Who cares it turns U. S. marine and soldier a yellow hue? Who could confuse G. I. with Jap? Still a world problem, malaria comes under the control of war necessity.

Guadalcanal . . . Bougainville.

Other front attacks on the insect foe on Pacific isles, in teeming jungles, conquered cities and home cottages. Dichloro-diphenyl trichloroethane, DDT for short, is death to disease and insects. Sprayed from the air, it has captured territory held by insects that our armed forces could otherwise occupy only at cost of disease losses. DDT stands for "deals death to typhus." Sweeter than the most exotic perfumed talcum is DDT powder to an army fighting typhus-carrying lice or to civilians in a city gripped by rising typhus epidemic. New poison warfare against rodents is ANTU and not kind to rats is 1080, both new chemical compounds to keep in check the animal foe "underground" in all our cities. No hope of getting the rats to join the UNO.

DDT, Naples . . . ANTU, Baltimore

It has been a metallic war with steel by the millions of tons, more aluminum than ever dreamed of before, lighter magnesium snatched from the sea, and tin and lead and copper closely hoarded to serve the machines of Mars. New alloys of steel, using metals we have much of instead of those we have not so much of, are here to serve the huge demands of reconversion and depleted shelves of commerce.

Electricity coats the precious tin upon tin cans to be; a saving method that will work in peace as well as war to keep our tin can civilization going. Substitutes, plastics and the like, lend metals a helping hand, and competition will tell whether the assistance will turn to rivalry. Machines for cutting, shaving, forming metals, produced in larger volume than the world has ever known, give us the best productive capacity for a machine-operated, expanding industry for creative peace, replacing destructive war.

Steel 1808 . . . Al-Mg 4303.

We were bouncing along merrily on rubber when war punctured the flow of our plentiful stream of latex from the East Indies. Great chemical works making synthetic rubbers of several different kinds have mushroomed in our tem-

Helping you sleep better

It may seem a bit unusual... ...that an electrical manufacturing company serving so many needs of a wide-awake, workaday world should be interested in helping you *sleep*. But with General Electric it's a fact.

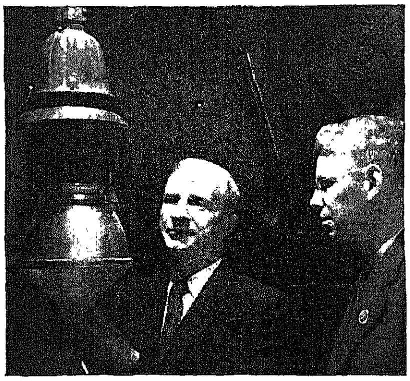
Air conditioning units that make every night in the year "a good night to sleep"—automatic home heating systems—silent fans—quieter street cars and buses—heating pads—and featherweight electric blankets for zero nights...

These are only a few of the many aids to better sleep developed by General Electric engineers and research scientist. *General Electric Company, Schenectady, N. Y.*

She likes to sleep "snug as a bug in a rug" on zero nights. Her husband is a ruggeder, warmer-blooded sort. But a feather-weight G-E automatic blanket for each is perfect—for these blankets can be adjusted to keep beds at any degree of warmth evenly all night long, despite temperature changes. G-E automatic blankets are made according to the same principle that keeps high-altitude flying suits "electrically warm" even at 60° F. below zero.

Taking the clatter out of the trolleys. Lucky indeed are folks sleeping along the routes of modern street cars and G-E powered electric trolley coaches. For these hush-hush vehicles barely whisper when they pass—even at full speed. The electric trolley coach is quieter by actual noise-meter test.

Taking the buzz out of fans means taking the buzz out of the blades. For a lot of fan noise, like airplane noise, comes largely from the whirring blades. The result of G. E.'s designing and testing innumerable fan blades is the unique "Vortalex" type. You can hardly hear it even if you listen carefully!



Taking street light out of bedrooms. This new street light is the greatest advance in residential street lighting in 40 years. Designed by G-E lighting engineers, it projects light away from the houses and to the street. It provides more light on the street where it belongs and less on your house front.

More Goods for More People at Less Cost

GENERAL ELECTRIC

952-644-211

perate industrial climate to replace rubber trees, native to the Americas, but cultivated so laboriously in the tropical east. Our guns, our ducks, our jeeps, our airplanes, our auto pools, our buses, our thousand and one rubber-hungry mechanisms were kept shod with precious stocks of natural rubber and increasing supplies of man-made rubber. Self-sufficient, thanks to war, our rubber age can expand and run smoothly, using each complexity of elastic stuff to its best abilities.

GR-S . . . Neoprene.

Old plastics were put to new uses and new plastics were put to old uses. The silicone family took its utilitarian bow, showing how a mere breath of an airy compound could waterproof paper, for instance, and how this combination of very plentiful elements could moistureproof spark plugs and do other fighting jobs. The vinyl family coated fabrics and made sheetings that replaced textiles. Nylon left the legs of ladies to parachute aviators to safety. Milk, soybeans, and other protein sources became raw materials for wool-like textiles. The postwar era will be a plastics age.

Bakelite . . . nylon.

Ill-fed, as FDR observed about a third of our depression USA, characterizes an unhappy part of humanity in war and postwar. Yet we know more about eating well and our farms can produce more with less effort. The seven kinds of foods that all should eat, and the ability to live healthily on rationed food and even like it. Dehydrated food saved the costly transport of water overseas in precious cargo space, and front-line fighters lived well out of clever combinations in cans. Quick freezing brought Florida in April to the Pacific in December. For kitchens of the future these war devices hold much promise, decreasing the drudgery of feeding the family and increasing the pleasure of eating. For ravaged peoples, potential defense against starvation until their earth is green again.

Vitamins . . . Amino Acids

In blackest night, foggiest sea, cloudiest sky and at highest height, an airplane can be spotted with electronic eyes called radar. Whole landscapes can be "seen" where there is no light. Big and little guns can be aimed effectively at ships or shore or aircraft that the gunner never sees. On bombing raid or transport flight airplanes can locate themselves accurately in a few seconds, using a radio navigation device called loran. New radio, television, frequency modulation, walkie talkie, and a dozen others. These new electronic devices and others

Do You Know?

Stories that *swordfish* sometimes attack whales are unconfirmed.

Oranges in 1944 accounted for 73% of the total world citrus crop.

Unbreakable *mirrors* are made of transparent plastic coated with silver.

Botanical drugs are being grown experimentally on a Pennsylvania farm.

Colors in fishes are in general produced by oil sacs beneath the skin, or in some cases beneath the scales.

Pitchy spots and knots on new *lumber*, before painting, should be covered with shellac or aluminum paint.

The U. S. Maritime Commission is selling surplus boat *anchors*—by the pound.

A machine that digs, picks and sacks *potatoes* in one operation has been constructed and is in successful use.

Potted plants usually grow better if the pot is sunk deeply in sand or peat moss that is kept moistened; the moisture enters the pot through the porous clay wall.

American *scientists* are now in Germany studying such wood products as cellulose, wood sugar, ethyl alcohol, feeding yeast and others that supplied the Nazi war machine during the war.

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Medical science is better equipped today than ever before to prevent trouble above the hair line; or, should some difficulty already have arisen, to deal effectively with it.

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like them, war-born, will be used in peace and bring forth new applications for factory, transport, community and home.

UHF . . . FM.

One hundred plus octane gasolines for fighting planes mean better gasolines for new automobiles we shall drive a few years hence. Ironically, kerosene is the fuel of jet-propelled craft. That new car will benefit from the machines for war, and farm machinery and tractors will be improved by the test of mechanized warfare. And not just jeeps pulling plows and herding cattle. Intensive engineering and production experience in all industry should roll the peacetime products into use with better value for the dollar and more money in the pay check. From bomber-factories—that were—will come the insides of new homes, bath, furnace, kitchen units. Or personal planes that become the trans-country air car of the executive. Or complete little houses to dot landscapes unfilled. Or peacetime "ducks" and "weasels" to blend the country cottage with the motor boat.

Faster . . . better . . . cheaper.

Atoms rule the world. When plutonium cyclically fissioned over Hiroshima, either extinctive future war began or a very energetic future world of goodness was made possible. Controlling the human beast is now more important than man's mastery over inanimate nature. What goes on in human minds and emotions precasts the future more irrevocably than any conversion of mass into energy. The human equation can negate or use the Einstein equation. Human behavior must learn to use atomic behavior. Statesmen need scientists who understand human thoughts and emotions to help them control the people who can keep the atoms under control. We face the world's grandest opportunity or largest disaster.

U . . . Pu.

For the opportunity of remaking a brave, new world, thanks. For powers large enough to do it, thanks. For confidence and understanding among all who inhabit the earth, we hope.

Science News Letter, November 17, 1945

ENGINEERING

Simplest Engine in World Helps Launch Gliders

➤ A MODEL of an engine, claimed to be the simplest engine in the world today, was demonstrated recently at the Polytechnic Institute of Brooklyn by Zygmunt Fonberg, the Polish rocket expert and inventor of the first bazooka in Poland prior to the war. It is a ram jet motor of new and unusual design.

This new engine was designed to help launch gliders into the air. It consists of a cylindrical tube, which appears to be just an empty pipe, mounted on a restraining structure which has a free moving arm to permit the engine to swing in a circle around it when in operation.

The lining of the tube expands from a smaller diameter in the front end to a larger diameter at the other. The space on either side of the lining and the outer wall contains the gas which runs into a nozzle at the forward end of the cylinder. Air mixes with the gas coming through the small holes of the nozzle during combustion, thus providing the force of propulsion.

Science News Letter, November 17, 1945

On Antibody Formation

It is well known that severely underfed patients with nutritional edema are excessively susceptible to infections, that infections superimposed on wasting diseases or marasmic states show a rapid, frequently fatal course. In the light of recent findings, both of these facts—heretofore but poorly understood—may well be on the way to conclusive explanation.*

Evidence is rapidly accumulating that antibodies, our chief weapon against infection, are modified proteins of the globulin type. During active immunization, antibody formation presents a continuous process, requiring its share of amino acids.

Experimentally it has been demonstrated that induced hypoproteinemia reduces the capacity to produce agglutinins, precipitins, hemolysins. Adequate protein intake thus gains increasing significance as an essential factor in the resistance to infectious disease.

Among the protein foods of man meat ranks high, not only because of the percentage of proteins contained, but principally because its proteins are of high quality, able to satisfy every protein need.

**Cannon, P. J.: J. Am. Diet. Assn. 20:77 (1944)*

The Seal of Acceptance denotes that the nutritional statements made in this advertisement are acceptable to the Council on Foods and Nutrition of the American Medical Association.

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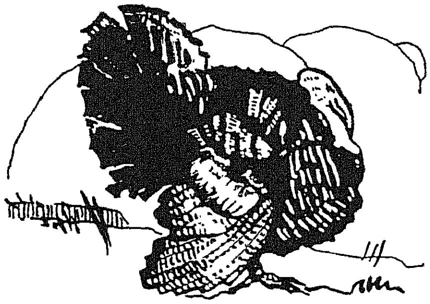
ORNITHOLOGY

NATURE RAMBLINGS

by Frank Thone



Much-Traveled Bird

➤ AS THANKSGIVING Day approaches, the turkey again struts to the fore in public attention. No magazine or Sunday newspaper feature section is complete without one, and flocks of the big birds, both living and stiff in death, appear in the markets.

We are all familiar with the fact that the turkey's name is a misnomer, that the native home of the bird is in the New World and not the Old; and many are the conjectures as to how he picked up the name of an Asian empire as his own.

Paradoxical though it may seem, it appears probable that this highly American fowl did come to the United States from Turkey—or what was Turkey at the time our colonizing ancestors settled on the Atlantic seaboard. For the turkey of our farmyards and Thanksgiving-Day platters is not descended from the wild turkey our ancestors may have hunted in the Eastern woodlands, but from already tamed stock which they brought with them from Europe. And this Europeanized turkey was the descendant of one or more kinds of turkey which the Aztecs, Mayas and other highly civilized Indians of Middle America possessed as domestic poultry when the Spaniards first made contact with them.

Carried home to Spain, the turkey appears to have passed into the hands of that country's Mohammedan neighbors on the opposite shores of the Mediterranean, and thence to the center of Mohammedan power and culture, the Turkish capital of Constantinople. Thence the multiplying birds diffused, like several other American products such as corn, tobacco and pumpkins, over the lower Danube valley, then part of the Turkish empire.

In this roundabout way, new things from New Spain found their way eventually into the hands of northern Europeans. Maize or Indian corn was long known in western Europe as Turkish wheat, and the first published European name of the common pumpkin was Turkish cucumber. Curiously enough, however, the turkey was not called by that name on his first appearance in print, in the sixteenth century, but was named "a cok of Inde." When turkeys first appeared in Europe they were somehow confused with what we now know as Guinea fowl, which came from Africa and which had already picked up the name of Turkey fowl. When the zoological distinction between the two was finally made clear, the name turkey stuck to the wrong bird. And there it has stayed ever since.

Science News Letter, November 17, 1945

WILDLIFE

Food Supply of Deer Increased by Ice Storm

➤ SEVERE ice storms may be a blessing to deer and other wildlife if they last but a short time and are not accompanied by low temperatures. By breaking boughs and uprooting trees, thus bringing more green leaves within the reach of the deer, such a storm can actually improve their present and future food supply.

Some 1,120 pounds of cedar browse per acre were provided in some regions during the severe ice storm in central Maine in November, 1943, which bowed down or snapped off many forest trees, James D. Curtis of the department of forestry, University of Maine, reports in the *Journal of Wildlife Management.* From animals found feeding on these trees and from tracks and other signs that the region had been visited, it was obvious that deer and rabbits soon discovered this food.

Science News Letter, November 17, 1945

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• Books of the Week •

CRIMINOLOGY AND PENOLOGY—John Lewis Gillin—*Appleton-Century,* 615 p., $4.50. Third ed., revised and enlarged.

THE ETERNAL ONES OF THE DREAM: A Psychoanalytic Interpretation of Australian Myth and Ritual—Géza Róheim—*Int. Univs. Press,* 270 p., illus., $4.50. The most recent development in psychoanalytic theory applied to the latest anthropological data.

FLOWING GOLD: The Romance of Oil—John J. Floherty—*Lippincott,* 256 p., illus., $2.50.

GENERAL BIOLOGY AND PHILOSOPHY OF ORGANISM—Ralph Stayner Lillie—*Univ. of Chicago Press,* 215 p., $3.

INDIAN HARVEST: Wild Food Plants of America—Jannette May Lucas—*Lippincott,* 118 p., illus., $2.

INTER-AMERICAN CONFERENCE OF PROFESSORS OF HYGIENE—*Pan American Sanitary Bureau,* 151 p., paper, illus., free.

IN THE DOCTOR'S OFFICE: The Art of the Medical Assistant—Esther Jane Parsons—*Lippincott,* 293 p., illus., $2. Based on a series of lectures given by the author to medical assistants in training.

ORGANIZATION OF TECHNICAL RESEARCH IN INDUSTRY: A Monograph—F. W. Blair and others—*Industrial Research Inst.,* 15 p., paper, free. Prepared by a committee on research organization.

PATHOLOGY OF TROPICAL DISEASES: An Atlas—J. E. Ash and Sophie Spitz—*Saunders,* 350 p., illus., $8.

PRINCIPLES OF RADIO FOR OPERATORS—Ralph Atherton—*Macmillan,* 344 p., illus., $3.75. A practical manual written for those with no previous training.

ROSENBERG'S NAZI MYTH—Albert R. Chandler—*Cornell Univ. Press,* 146 p., $1.75. A study and criticism of the main features of the Rosenberg doctrine.

THE SPICE HANDBOOK: Spices, Aromatic Seeds and Herbs—J. W. Parry—*Chemical Pub. Co.,* 254 p., illus., $6.50. A guide for manufacturers, importers and salesmen desiring greater knowledge of spices and important aspects of the spice trade.

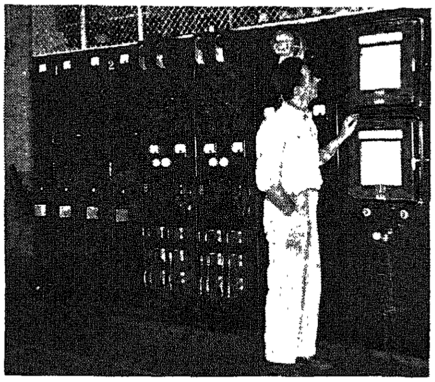
TABLES OF ASSOCIATED LEGENDRE FUNCTIONS—Lyman J. Briggs, Arnold N. Lowan and others—*Columbia Univ. Press,* 303 p., $5. Prepared by the Mathematical Tables Project under the sponsorship of the National Bureau of Standards.

WARTIME TECHNOLOGICAL DEVELOPMENTS: Supplement for 1944—*Supt. of Doc.,* 197 p., paper, 50 cents. A study made for the Subcommittee on War Mobilization of the Committee on Military Affairs, U. S. Senate. Many of the 839 items of wartime technical advance, some of which have great potentialities for peace time production, appeared in the SCIENCE NEWS LETTER during 1944.

Science News Letter, November 17, 1945

Synthetic rubber cannot be reclaimed by the same methods used to reprocess natural rubber and chemists still have before them the problem of finding a method for synthetic rubber tire reclamation.

Although no important source of *petroleum* has ever been established in Cuba, oil companies are now active in geophysical surveys and exploratory drillings.



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New Machines and Gadgets

⚙ *LANGUAGE master, a record player machine used in teaching languages, has a device that permits accurately spotting and repeating intricate phrases and sentences again and again until mastered. It can be used with crystal headphones without amplifier when desired.*

Science News Letter, November 17, 1945

⚙ *PRESSUREGRAPH is an electronic instrument that indicates, on a cathode-ray oscillograph, pressure-time curves of an internal combustion engine, pump, airline, or of any other enclosed pressure system. It is simple in operation, only one control being required.*

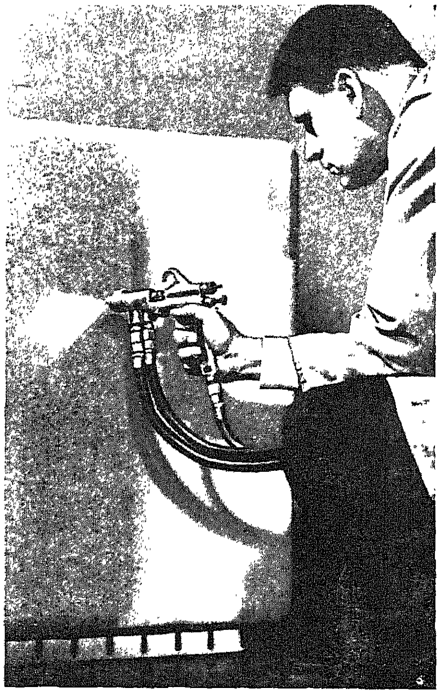
Science News Letter, November 17, 1945

⚙ *AUTOMATIC dishwasher, for the home, sprays the dishes, glasses and silverware placed in it, washes them, rinses them twice, cleans and drains itself and then shuts itself off. Electrically operated, it does the complete job in about 12 minutes.*

Science News Letter, November 17, 1945

⚙ *VACUUM cleaner, a lightweight household model, has an elongated plastic receptacle for the dirt instead of the ordinary dust bag. Although the handle of the cleaner passes through the center of the plastic dust holder, the holder is easily removed for emptying.*

Science News Letter, November 17, 1945



⚙ *TWO-COLOR spray gun gives, in one operation, two-coat spatter finishes simulating iridescent metal. Two colors are sprayed at the same time through a single nozzle. As shown in the picture, it resembles the ordinary spray gun but has two fluid inlets near its head.*

Science News Letter, November 17, 1945

⚙ *INTERPHONE system for tanks on the battlefield permitted communication between tank commanders. The men plugged cables from telephone headpieces into interior switchboxes connected with exterior boxes on which were signal lights and terminal binding posts for field connections.*

Science News Letter, November 17, 1945

⚙ *STAINLESS steel films of microscopic thickness on the lenses of sun glasses enable flyers to look directly at the sun by turning their eyes upward. Through the center the glasses are comparable with ordinary sun glasses, transmitting enough light for normal, daytime vision. The thickness of the film increases toward the rim.*

Science News Letter, November 17, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 285.*

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Question Box

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What discovery may help solve the riddle of how multiple stars and dark planets are created? p. 308.

ASTRONOMY-METEOROLOGY

How may the weather be indirectly controlled? p. 310.

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What has made it possible for genes to actually be seen at work for the first time? p. 313.

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How may young scientists now secure draft deferment? p. 311.

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How true is the old saying, "Blind as a bat"? p. 313.

Where published sources are used they are cited.

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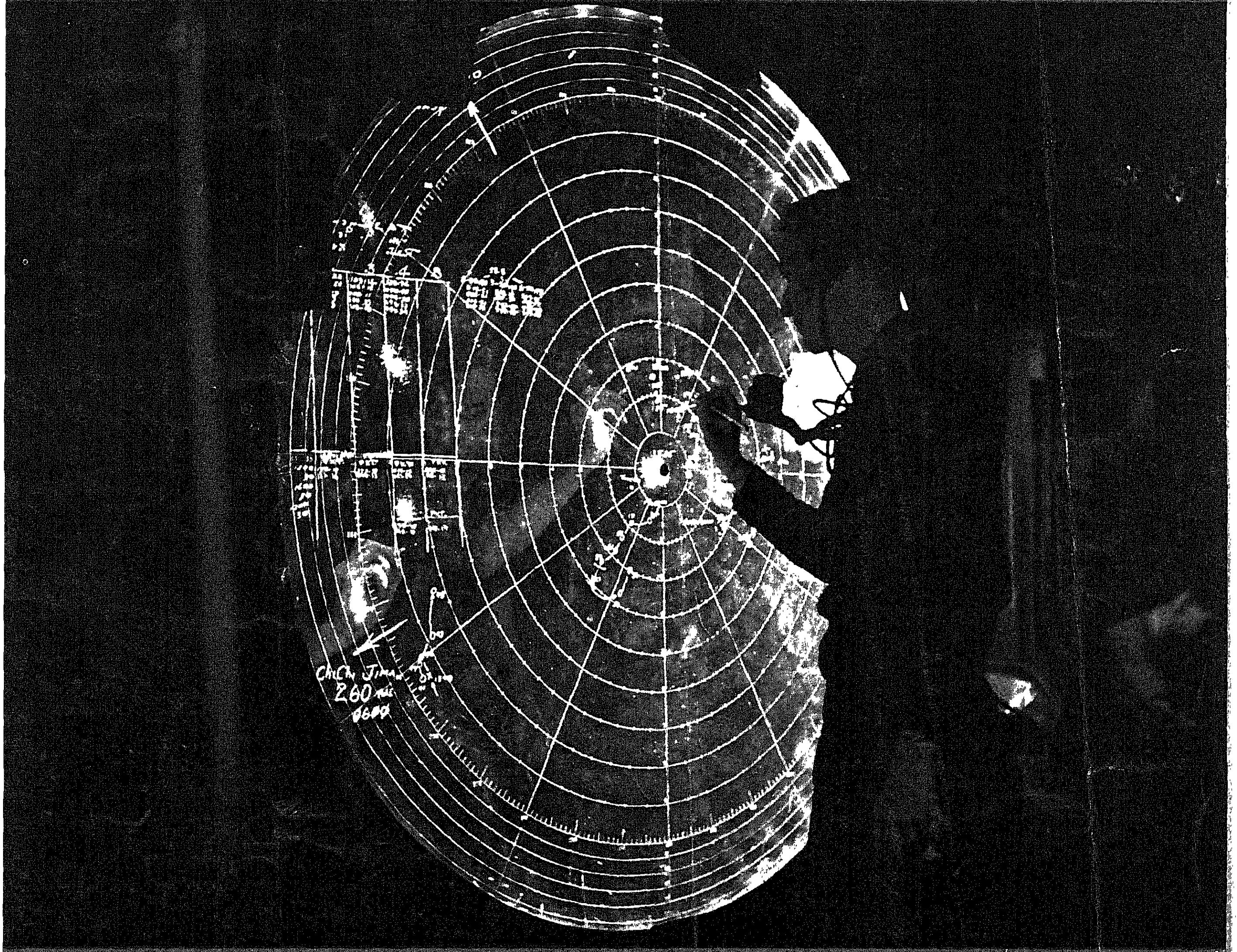
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • NOVEMBER 24, 1945



Vital Information

See Page 329

A SCIENCE SERVICE PUBLICATION

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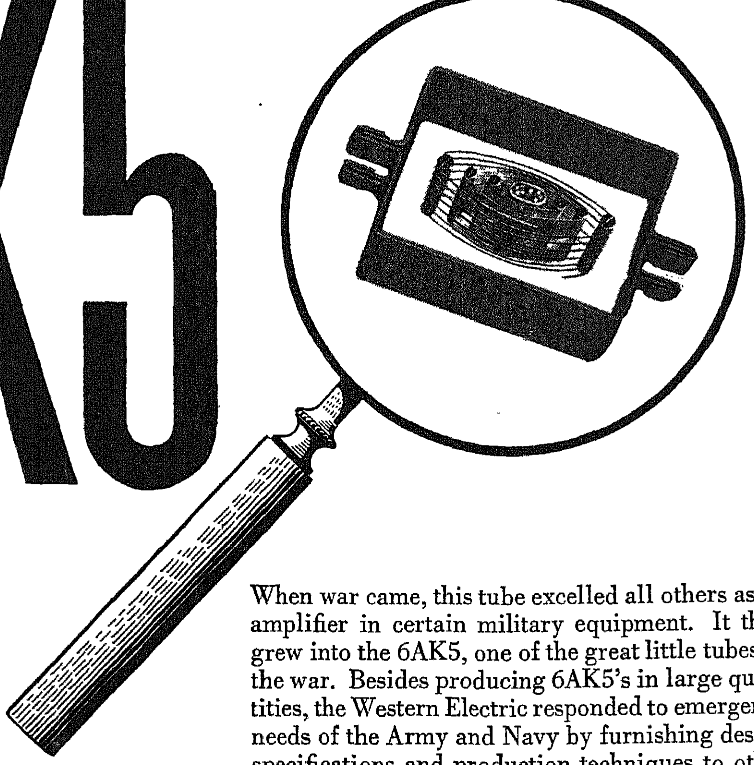
TINY GIANT WITH A HISTORY

Long before the war, the men who design your Bell Telephone System were looking for an electron tube with frequency capabilities never before attained. With it, they could transmit wide bands of telephone messages — several hundred of them — simultaneously through coaxial cable — economically, and over long distances.

They developed a tube which set a new standard in broad-band, high-frequency amplification. So minute that its electrode system had to be inspected under a magnifying glass, the tube could amplify either the voices of 480 people talking at the same time, or the patterns of television. Long-distance transmission became a commercial reality.

6AK5



When war came, this tube excelled all others as an amplifier in certain military equipment. It then grew into the 6AK5, one of the great little tubes of the war. Besides producing 6AK5's in large quantities, the Western Electric responded to emergency needs of the Army and Navy by furnishing design specifications and production techniques to other manufacturers, of whom at least five reached quantity production. On every battlefront it helped our ships and planes to bring in radio signals.

Developing electron tubes of revolutionary design has been the steady job of Bell Laboratories scientists ever since they devised the first practical telephone amplifier over thirty years ago. Now tubes like the 6AK5 will help speed the living pictures of television, as well as hundreds of telephone conversations simultaneously over the coaxial and radio highways of the Bell Telephone System.

BELL TELEPHONE LABORATORIES

Exploring and inventing, devising and perfecting for continued improvements and economies in telephone service.

MEDICINE

Flu Vaccine for Civilians

Effective against Types A and B, the vaccine is like that used for the Army and should be available by Dec. 1. No signs of an epidemic this winter.

➤ INFLUENZA vaccine of the kind now being given to all Army personnel will be available for civilian use by Dec. 1 or shortly after.

The vaccine is effective against Types A and B influenza. These are the types which have caused epidemics in recent years. Other types of influenza virus exist. Authorities do not know whether the world-wide influenza epidemic in 1917-1918 was due to A or B virus or to some other type.

Army studies, prior to the general vaccination order, showed that about 75% of those vaccinated were protected against influenza during outbreaks which occurred soon after the vaccination. How long the immunity, or protection, lasts is not definitely known.

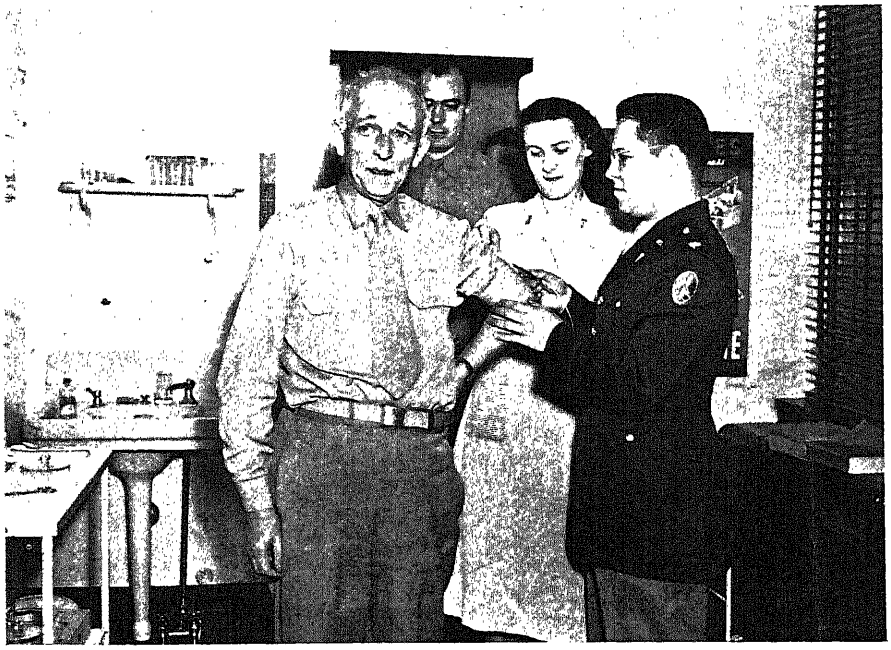
The vaccine is given by hypodermic injection under the skin of a single dose of one cubic centimeter (about one-fourth of a teaspoonful).

Civilians whose physicians advise them to be vaccinated will find that the vaccine is expensive. Actual manufacturing costs are about 50 cents to one dollar per dose. Retail costs may be three to five times as much.

The vaccine is made from influenza virus grown on chick embryo. (See *SNL*, March 10). The following firms have been manufacturing the vaccine: Lederle, Squibb, Sharp and Dohme, Lilly, Pitman-Moore and Parke-Davis. Some manufacturers have already applied to the National Institute of Health for licenses to manufacture the vaccine for civilian use. Others will doubtless make similar requests soon and it is expected that firms which have not yet made the vaccine may do so in the future.

Influenza at present shows no signs of becoming epidemic this winter. Cases reported to the U. S. Public Health Service since Jan. 1 total about 85,000 compared to some 350,000 for the same period last year. Some widely scattered small outbreaks last spring led Army medical officers at that time to anticipate an epidemic this winter. Although it has not yet materialized, the possibility at that time led to plans for vaccination of all personnel as soon as sufficient vaccine was available. By October there was enough of the vaccine to order general vaccination.

Science News Letter, November 24, 1945



GENERAL GET HIS—Maj. Gen. Norman T. Kirk, Surgeon General, U. S. Army, is getting his influenza vaccine shot. Left to right, Gen. Kirk, Lt. M. Ellen Evans, Maj. J. C. Strong. Photograph by Fremont Davis, Science Service staff photographer.

PHYSICS

New Atomic Particle Being Investigated

➤ A NEW SORT of atomic particle or system consisting of a positron (positive electron) hooked to an electron is being investigated as the result of some thinking aloud about its possibilities that Prof. J. A. Wheeler of Princeton University has presented to the metropolitan section of the American Physical Society.

One of the most elusive and short-lived particles in the subatomic world is the meson, also called the mesotron, which is one of the results of cosmic rays rushing into the earth's atmosphere. These mesons, discovered in 1937, exist only for a millionth of a second or less.

The new particle, or whatever it is, that Prof. Wheeler suggests may exist, is as short-lived, and is considered to be a combination of the electron (which is the unit of negative electricity) and the positron (the positive electron discovered in 1932), holding cosmic hands with each other. In fact, this meson-like entity may be two positrons and two electrons, combinations of two of one and one of the other, or even three of each.

The new atomic baby, if it exists, has not yet been named and probably will not be until physicists are more sure that it exists, but it may be called "electromeson," "polyelectron" or "polytron."

Prof. Wheeler has suggested how a trap could be set for the new entity to determine whether it exists. It seems that when the positron and the electron come together annihilation occurs and two gamma rays are produced, rushing away at right angles to each other (polarized, as the physicists say). So if there are set up some counting devices that click when the X-ray-like energy of gamma rays comes along, and if two of them at right angles to each other click as one, then the physicists will feel rather sure that a "polytron," or what they want to call it, did exist a few minute fractions of a second earlier.

No use for the polytron is foreseen, if it really is. But then before the late war lots of people, now frantic about atomic bombs, would have seen no use for the fission of the uranium atom, if they had known or cared.

Science News Letter, November 24, 1945

ELECTRONICS

Specialized Loran

SS Loran, developed as navigation aid for overland routes where standard loran is not effective, replaced radar in bombing Berlin.

➤ A SPECIAL kind of loran navigating system, another important wartime scientific achievement, replaced radar bombsights on Allied bombers during the last year of the European war in assisting them to locate Berlin and other enemy targets to drop their loads of destruction, it is now revealed. The Germans, by special receivers, found a way to detect approaching radar-using planes, but not those operating on loran.

SS loran, as the method is called, is a special variation of the standard loran, the long-range aid to navigation of both air and surface ships. SS stands not for steamship but "sky-wave synchronized." SS loran is particularly for use by aircraft on overland routes where the standard loran is not effective at ranges over some 200 miles. SS loran has an overland range four or more times as great.

Like the standard loran, the SS variety is a development of Radiation Laboratory on the campus of the Massachusetts Institute of Technology, a wartime research and development institution under the sponsorship of the Office of Scientific Research and Development.

Ships at sea or in the air are able to pick up two sets of waves from the land-based loran station, one a so-called ground wave that comes to them directly, and the other "skywaves" which are reflected waves from the sky, thanks to the reflection of the signals in the 160-meter band by the ionosphere. The ground waves of standard loran are used ordinarily, particularly in daytime.

Loran itself was one of the most tightly held secrets of the war. It consists of a vast network of radio stations which in effect spread into space an electric stopwatch accurate to a millionth of a seond. By means of a special receiver on board ship or plane a navigator picks up radio signals from two stations separately by about 400 miles, and by comparison can locate the geographical position of his craft with as great accuracy as is provided by celestial navigation based on shooting the stars or the sun with a sextant.

The loran receiver determines with great accuracy the difference in the time at which the two signals from the loran transmitting stations are received. Curves are printed on a navigation chart showing the loran lines of positions for various time differences. Since the areas of frequent travel by ships and planes are blanketed by the loran signals from several transmitters, the navigator can determine three or four or more such lines of position.

Where these lines cross gives the point known as a "fix" which represents on a simple navigation chart, with which the navigator is furnished, just where the craft is located.

One of the early recognized shortcomings of standard loran was its relatively short range over land, some 200 miles for the ground waves, while over sea water the range was about 800 miles. However, after sunset the skywave signals traveled as well over land as water with a minimum usable range of about 200 miles and a maximum of about 1,400 miles. Also, analysis of skywave readings indicated unusual stability with respect to timing, a stability which increased with distance.

Early in 1943, according to Prof. J. A. Pierce, head of the loran division at Radiation Laboratory in Cambridge, Mass., an experiment was arranged between two American loran stations, one being instructed to synchronize itself with the skywaves from the other during one of the nighttime periods when regular operation was not scheduled. Excellent synchronization was made and held. The tests were observed at the laboratory, and the readings taken revealed a line-of-position error of only about 0.5 mile. This experiment marked the birth of SS loran.

Science News Letter, November 24, 1945

GENERAL SCIENCE

Cultural Reconstruction Of Devastated Countries

➤ THE EDUCATIONAL and cultural reconstruction of the war-devastated countries will be a principal concern of an interim commission to carry on after United Nations Educational Scientific and Cultural Organization Conference adjourns.

This commission will remain in session in London to undertake urgent problems in the coming weeks. In its reconstruction work it will operate through UNRRA.

It will also promote scientific and cultural travel by experts, professors and students, and arrange exchanges between the various nations.

Paris has been recommended by the conference as the future seat of UNESCO.

Science News Letter, November 24, 1945

SCIENCE NEWS LETTER

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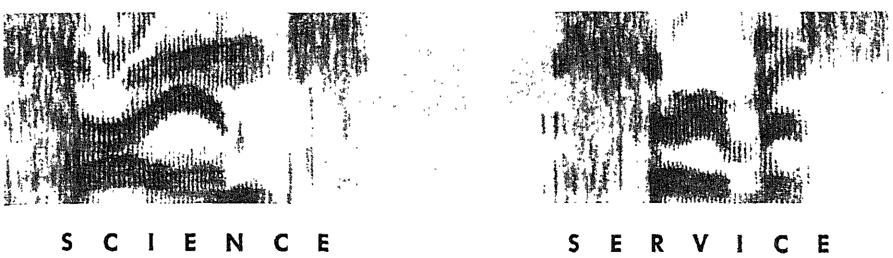

"SEEING" SOUND—Here is a sound spectrogram of the words, "Science Service," that will be the basis of devices for translating sound into visible, easily understood patterns for the deaf. (See SNL, Nov. 17.)

CHEMISTRY

Streptomycin Structure

Synthesis of antibiotic that rivals penicillin as remedy may be the next step. Large scale production of the drug might then be speeded.

➤ THE ACTUAL chemical structure of streptomycin, antibiotic that rivals penicillin as a remedy for infections, has been worked out almost completely by a group of scientists at the research laboratories of Merck and Company. Details of part of the work are reported in *Science* (Nov. 16), by Drs. Norman G. Brink, Frederick A. Kuehl, Jr., and Karl Folkers.

With this knowledge of the chemistry of streptomycin it may be possible to synthesize and manufacture the drug. In that case patients and their physicians would not be dependent as at present on the amounts of material that can be obtained by the tedious process of growing the soil organism, Streptomyces, and extracting the chemical from it.

Development and manufacture of a master chemical for germ-fighting that could replace streptomycin, penicillin and other antibiotics, or of a series of such chemicals, each designed for overcoming a particular group of disease germs, is another possible result of the discovery of how one such substance is put together chemically in nature. Hope for this is less solid than for the synthesis of streptomycin, difficult as that undoubtedly will be. The germ-stopping activity of antibiotics may depend on the entire chemical structure of the various substances, not on any part of it, and may be lost when the original structure is altered.

Streptomycin itself, the Merck researchers find, breaks up into two portions to which they give the "convenient trivial names" of streptidine and streptobiosamine. Together they are made up of 21 carbon atoms, 37 or 39 hydrogen atoms (the scientists are still uncertain of two hydrogen atoms), seven nitrogen atoms and 12 oxygen atoms. Streptomycin has the "general constitution of a hydroxylated base (streptidine) attached through a glycosidic linkage to a nitrogen-containing disaccharide-like molecule."

Science News Letter, November 24, 1945

AERONAUTICS

General Arnold Gives New Words for New Age

➤ MOTORJET, turboprop, turbofan, turbojet, ramjet, pulsojet. These words "carry more meaning for Americans than any other six words I know," says General H. H. Arnold in his third report as commander of the Army Air Forces.

No one can understand the language of aeronautics, much less the language of the future, if he does not know the meaning of words such as these. They will be a part of every-day life. The coming of the jet-propulsion age assures this.

These six strange sounds describe six distinct methods of utilizing atmospheric oxygen for propulsion. Only two of the words have probably been heard before by the American public. The "pulsojet" or intermittent jet idea is incorporated in buzz bombs. The V-1, prized weapon of the Germans, made this word known. Planes like the P-80, the P-59 and the new British Gloster Meteor jet plane that now claims the world speed mark, all owe their power to the "turbojet," gas turbine and jet combination.

In the future you will see "motorjet" planes with enclosed propellers instead of exterior ones.

"Turboprop" planes will have gas turbine engines plus these propellers. The usual reciprocating engines will be replaced not only in these, but in planes using the "turbofan" plan, which employs a gas turbine plus a ducted fan. The "ramjet" principle is most suitable for super-high speeds. There will be no mechanical compression as of old, but a continuous jet with compression by aero-dynamic ram.

It may be all technical now. "Gasoline" was an unknown word not too long ago. Some of these sounds may get so common that babies will be saying "ramjet" along with "dada."

Science News Letter, November 24, 1945

PUBLIC HEALTH

Fewer Health Complaints Among Industrial Workers

➤ INDUSTRIAL workers have decidedly fewer health complaints, now that the war is over. They have less nervous indigestion, insomnia, cumulative fatigue and nervous exhaustion. Blood pressure readings are lower in employees over 45 years old.

These findings, from a survey begun last April and planned to continue into next year and to include several hundred plants of all sizes involving over 1,000,000 workers, were reported by Dr. C. O. Sappington of Chicago at the meeting of the Industrial Hygiene Foundation in Pittsburgh.

"Shorter hours of work and relief from pressure of production and the general anxiety generated because of the possibility of being called into the armed forces" are the reasons Dr. Sappington gives for the improvement in industrial workers' health.

"On the other hand," he stated, "in some quarters there has been an increase in the incidence of occupational disease in plants which have had no such experience during the years of the war emergency. This may be due to the laying off of professional personnel and termination of employment of others."

Referring to current labor problems, he said:

"One element in sustaining and maintaining an adequate industrial health service is the opportunity to maintain production at a high level. This interdependence is apparently overlooked in the battle for shorter working hours and more pay."

Science News Letter, November 24, 1945

PHYSICS—MILITARY SCIENCE

Banish Atom Production

General Arnold sees this as the best defense against the bomb. Advises also devising every possible active defense against an attack.

➤ GENERAL H. H. Arnold, in his report as commander of the Army Air Forces, confirms with high military authority the contentions put forth by the scientists who worked on the atomic bomb that the best and almost the only defense against this super-weapon is to make sure that it is not being made anywhere in the world.

This is one of three types of defense against the atomic bomb suggested by General Arnold:

"Make sure that nowhere in the world are atomic bombs manufactured clandestinely." The atomic scientists agree with this idea, and they urge further that the only real fundamental solution is world government or cooperation of some sort that removes the likelihood of war.

General Arnold advises also that we should devise every possible active defense against an atomic bomb attack, once launched. That this is a most difficult task is made clear by General Arnold. The chief difference between an atomic bomb and the largest type of conventional bomb lies in the immense destructive power of a single atomic missile. This means, General Arnold explains, that measures intended for protection against an atomic bomb attack must be highly efficient from the very start of a war if they are to be any good at all. And General Arnold remarks that our experience in this war has shown that it is most difficult to attain this goal.

True space ships traveling 3,000 miles per hour outside the earth's atmosphere are all but practicable today and General Arnold further predicts that "research will unquestionably bring them into being within the foreseeable future."

This is the type of projectile from which atomic bombs in the future could be launched, when strategic bombing such as developed by the Army Air Forces and weapons of the general type of the German V-2 rocket are countered by improved anti-aircraft defenses.

"There now appear to be insurmountable difficulties in an active defense against future atomic projectiles similar to the German V-2," General Arnold admits, but he feels that this should only intensify our efforts to discover an effective means for our defense.

Redesign of our country for minimum vulnerability to atomic bomb attack, which means complete dispersal of our cities and moving vital industries underground, is the third atomic bomb defense suggested by General Arnold. This, he feels, would be overwhelmingly expensive, and the unsolved technological problems would present the greatest difficulty.

Unceasing air patrol of the entire world would do much to prevent the illegal manufacture of atomic bombs in their present form, General Arnold suggests, but this would need to be supplemented by ground inspection. The air patrol would be possible through the use of air contingents made available to the Security Council of the United Nations Organization.

The atomic weapon makes offensive and defensive air power, always ready, in General Arnold's words, "the primary requisite of national survival."

Science News Letter, November 24, 1945

PSYCHOLOGY—MILITARY SCIENCE

Search for Ways To Prevent Aggression

➤ SEARCH for a countermeasure for the atomic bomb should include a search for ways to prevent aggression and must not be confined to the purely physical sciences, the *Infantry Journal* will say editorially in its December issue.

"The soldier, like others," states the editorial of this official organ of the U. S. Infantry Association, "needs to think about all conceivable ways of countering the atom. About what might come, for example, of spending two billion dollars on an exploration of human aggression—into an organized search for ways of keeping men from wanting to enslave and destroy their peaceful neighbors.

"This would be a 'counter to the atom' and to all war."

There have been two main kinds of military countermeasures in past history, the editorial explains. One was to find a better, more destructive weapon; the other is the block, the guard, evasion, improved protection. But a more destructive weapon than the atomic bomb potentially may be, appears to be a purely academic conception.

"That," goes on the editorial, "leaves the other kind of countermeasure to consider, the measure that might avoid or turn the atomic blow. What could that be? Armor against the tremendous heat which is the energy loosed from the atom? An underground civilization? A means of detecting the distant approach or the very existence of the prepared materials of atomic destruction? Or a means of setting them off at great distances? Scientists of high standing in atomic research have already stated formally and publicly that they see no hope of countering the weapon they helped develop."

Science News Letter, November 24, 1945

AERONAUTICS

Giant Plane to Test Size Of Efficient Craft

➤ AVIATION science may get some new answers to old questions when the giant Hughes H-4 cargo plane undergoes its final tests soon. The giant flying cargo boat, now nearing completion, dwarfs even Consolidated-Vultee's 204 passenger clipper and is designed to carry over 200 tons of cargo at a cruising speed of 175 miles an hour.

Aviation experts have long wondered whether efficiency increases or decreases with size. Some have considered that planes as large as the H-4 would require gas turbine engines instead of the reciprocating type used. Some have insisted that there must be a size limit to planes.

All of these questions may be partially answered when the first flight of the H-4 takes place. The plane is 220 feet long, 30 feet high and has a beam of 25 feet. The wing spread of 320 feet makes it even more gigantic in size.

Eight Pratt-Whitney radial engines totaling more than 24,000 horsepower drive the new-type 17-foot four-blade propellers and are expected to give the H-4 a top speed of nearly 220 miles per hour.

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Nylon, if one wants a technical definition, is a generic term for any long-chain synthetic polymeric amide with recurring amide groups as an integral part of the main polymer chain that can be formed into a filament with the structural elements oriented in the direction of the axis.

HYDROPONICS

New Soilless Gardens

Are now in production in British Guiana Air Base to provide fresh vegetables for AAF personnel. Constitute largest project of kind.

➤ SOILLESS gardening to produce green vegetables for AAF men still overseas in the tropics is going into production on the largest scale yet undertaken, at Atkinson Field in British Guiana. One hundred standard hydroponic beds, each 300 feet long, three feet wide and eight inches deep, are growing tomatoes, lettuce, radishes, cucumbers and green peppers rooted in sterile washed gravel through which a solution of nutrient mineral salts in water is flowed at 48-hour intervals. The project is described in some detail by Lt. Allen E. Pripps, C.A.C., in the *Military Engineer* (Nov.).

In charge of this and all other soilless gardening projects under the Air Corps Quartermaster is Kendrick W. Blodgett, a civilian horticulturist, who has AAF officers and men as his aides. First project on a large scale was set up less than a year ago on Ascension island, mid-Atlantic air base just south of the equator. It has proved so successful that new installations of the same kind were planned. The new project is four times the size of the original one on Ascension island. Two others are now being set up in the Pacific, on Coconut island and Iwo Jima.

Because of the ending of the war and the cutting down of the number of men to be supplied locally, the Atkinson Field project turned out a surplus of lettuce from the beginning. This, Mr. Blodgett states, is being shipped to other bases in French and Dutch Guiana, Trinidad, Brazil and Puerto Rico. The same will be done with tomatoes when the expected surplus of these vegetables develops.

In general, it has been the Army's policy to grow vegetables in the ordinary type of gardens where soil and other conditions make it possible, and to resort to soilless gardening where conventional horticultural methods are impracticable. Thus, Ascension island is a desert mass of volcanic cinders, with neither soil nor water—all the water used for all purposes, including the garden, has to be distilled from sea water. At Atkinson Field there is rainfall enough, but the soil is a dense, barren red hardpan. Coconut island consists mainly of sterile white coral sand and rock. Iwo Jima is very much like Ascension island, except that Iwo's volcanoes haven't stopped smoking yet. So if the boys are to have their tomatoes and radishes, they'll have to raise them hydroponically.

Science News Letter, November 24, 1945

ELECTRONICS

"Racon" May Guide Ships Safely Through Dense Fog

➤ SHIPS near land may proceed with safety through fogs so dense that lighthouse flashes cannot be seen, with the help of radar equipment on board and radar beacons on shore. The radar beacon, called "racon" for short, is another scientific war development from which the lid is now lifted. It did an important war job, and now promises to play an important part in the peacetime safety of commercial shipping.

Racon is an electronic beacon placed ashore at selected positions to serve both surface and air ships. When radar signals from transmitters aboard ship are received by the beacon, its transmitter is triggered and it gives out automatically an answering signal in code. The code is its station identification. A navigator is able to fix his position in relation to the beacon by means of a simultaneous plot of both range and bearing of the beacon from the ship on the scope of his radar.

One of the first war uses made of the radar beacon was in the English-developed IFF apparatus, the letters standing for "identification, friend or foe." The responding equipment was installed in planes. It operated only when actuated by an interrogating set on the ground or in another plane. The response was automatic and was given in the particular code set for the day. The pilot was unaware of the waves of the interrogating set and also of the response. If an approaching plane failed to give an answer, and the right answer, it was regarded with suspicion.

While the IFF was a British development, it was improved in America and practically all instruments used by the Allies were made in this country. Wider uses of the principles employed in the IFF were developed at the Radiation Laboratory in Cambridge, where the greater part of the government's research and development of radio and radar was carried out.

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The *mung bean,* source of tender sprouts used in chop suey, is now grown in considerable quantities in the United States as a result of war conditions; the former supply came from China, India and Japan.

NO SOIL—Soilless gardens such as this one are in production at a British Guiana Air Base. These beds are growing lettuce.

PHYSICS

Pushbutton War Foreseen as Possibility

➤ A NEW KIND of pushbutton war through use of atomic bombs is visualized by Dr. E. U. Condon, newly named director of the National Bureau of Standards and technical adviser to the Senate's Atomic Energy committee.

The possibility of the diplomatic representatives of a foreign nation bringing atomic bombs piece-meal into the country under cover of diplomatic immunity, assembling them clandestinely, and then blowing the hearts out of all the leading American cities, is visualized by Dr. Condon, in an article written as Westinghouse associate research director, before he was given his government positions. (*Army Ordnance*)

"The next war should be described as the War of the Pushbuttons," Dr. Condon said. "For the atomic bombs are such small and simple devices that it is easy to visualize agents of an enemy nation bringing them in in small pieces, under cover of diplomatic immunity, and assembling them quietly in the closets or back rooms of their embassies and consular offices in our chief cities.

"Then when the decision to make war is reached, the ruler of the enemy nation has merely to say the word, and his agents in our country touch off the dozen or two bombs so planted in each of our major cities. And within minutes the entire hearts of each of them are utterly destroyed, and made to resemble the recently released photographs of Hiroshima."

Science News Letter, November 24, 1945

TECHNOLOGY

"Anhydrous" Vegetables Go on Market Soon

➤ VEGETABLES that are not merely dehydrated but "anhydrous" are the newest thing on the nutritional horizon. They are a development of Clarence Birdseye, pioneer in the quick-frozen foods industry, and are due to be offered on the public market soon.

Biggest advantage at the consumer's end is claimed to be the quickness and ease with which "anhydrous" vegetables can be reconstituted—that is, brought back to normal moisture content and made ready for cooking. As a matter of fact, it is really part of the cooking process itself. The dry vegetables are placed in a pot with enough salted water to cover them and brought to a boil as quickly as possible, then cooked over a lowered fire for a few minutes. That is all. Appearance and flavor are claimed to be indistinguishable from those of fresh vegetables.

They do, however, have to be prepared in cut-up form—riced, diced, sliced or what have you. You can't get a whole boiled anhydrous potato.

Secret of the new process, Mr. Birdseye stated, is the speed with which the water is extracted. In place of the 18 hours or so required in the customary drying process, "anhydration" is accomplished in an average of 90 minutes. Space and weight saving are described as enormous: five truckloads of vegetables that roll in at the receiving doors of the plant go out of the shipping door as one truckload.

The new vegetable products will be distributed by American Home Foods, Inc.

Science News Letter, November 24, 1945

OPTICS

Light Travels Fast Through New Glass

➤ A NEW TYPE of glass, in which the mineral beryllium fluoride is substituted for the silicon dioxide, or ordinary sand, used in conventional glass formulae, lets light go through at a higher speed than any other known glass, solid or liquid. Light velocity through beryllium fluoride glass is 146,000 miles a second, as compared with speeds of 186,000 miles a second in empty space, 140,000 miles a second in water, and 122,000 miles a second in the kind of glass used in spectacles.

The new glass has been produced experimentally in the laboratories of the American Optical Company, at Southbridge, Mass., and its properties have been studied by Dr. Estelle Glancy and Carl G. Silverberg. Because it causes less bending in a beam of light, and also produces less color-scattering effect, it may some day become valuable in the production of optical instruments.

At present, beryllium fluoride glass suffers from one serious handicap: it is hygroscopic, absorbing water from the atmosphere. If this can be overcome, and the glass produced in stable form, its useful career will begin.

Possibility of producing beryllium fluoride glass was first forecast on theoretical grounds in 1927 by a German scientist, V. M. Goldschmidt, who also predicted its low refractive index and low color dispersion. He apparently did not follow up his initial suggestion.

Science News Letter, November 24, 1945

IN SCIEN

PHYSICS

More Atomic Energy May Be Available

➤ ALTHOUGH scientists have split atoms with the consequence that the world has atomic energy and atomic bombs, there are many things about the elementary and fundamental particles of the universe that need further exploration.

The joint meeting of the American Philosophical Society and the National Academy of Sciences in Philadelphia heard Prof. John A. Wheeler of Princeton University raise new questions that need investigation.

Is there a possibility of converting into energy the entire mass of the neutrons and protons that make up the nuclei of all atoms? This was one question which if answered affirmatively might open the door to almost unlimited atomic power.

What are the relationships between various entities that occur in nature—neutrons, protons, neutrinos, photons, electrons, positrons and mesons?

Can one of these entities be transformed into another in the cosmic radiation and in stellar interiors? Prof. Wheeler asked.

Since man-made sources of high energy radiation are now available or in prospect, Prof. Wheeler said that scientists need to know what transformations of the elementary particles can be caused by such radiations and for which cosmic radiation will still be needed.

Science News Letter, November 24, 1945

CHEMISTRY

Boron Carbide Keeps Chemical Sample Pure

➤ ONE of the hardest mortar and pestles available is made of boron carbide, which is almost as hard as diamond. Glass can be ground into a fine powder with such a mortar and pestle set without marring the grinding surface, according to the *American Journal of Pharmacy.*

Boron carbide, made by heating boron and carbon in an electric furnace, is particularly useful in grinding substances for accurate analysis where the sample must be kept free from contamination.

Science News Letter, November 24, 1945

CE FIELDS

MEDICINE

Two Anti-Malaria Drugs Now Announced

➤ ANNOUNCEMENT of two of the many drugs developed during the war as possible weapons against malaria was made at the joint meeting of the National Malaria Society and the Southern Medical Association in Cincinnati.

From the National Institute of Health came news that a compound short-named NIH-204 proved adequate, like atabrine, in suppressing malaria attacks but did not cure early attacks. Neither atabrine nor NIH-204 was able to prevent the infection in trials reported by Drs. G. Robert Coatney, W. Clark Cooper, Martin D. Young and Robert E. Burgess of the federal research institute at Bethesda, Md. NIH-204 was more fully identified as 9-(2-diamylamino-1-hydroxyethyl) 1, 2, 3, 4-tetrahydrophenanthrene hydrochloride.

A new drug which both prevents and suppresses bird malaria was reported by Drs. Emanuel Waletzky and Sterling Brackett of the American Cyanamid Research Laboratories at Stamford, Conn. This drug is called metachloridine. Its full chemical name is 2-metanilamido-5-chloropyrimidine.

It is now being tried in human patients but long trials will be needed, the scientists stated, to show whether it has possible value in human malaria.

Science News Letter, November 24, 1945

MEDICINE

Penicillin Reduces Scarlet Fever Quarantine

➤ ISOLATION, or quarantine as it is popularly called, of scarlet fever patients might be reduced from the usual three or four weeks to eight or 10 days by penicillin treatment. This is one tentative conclusion of a study reported by Dr. Manson Meads, Dr. M. Eugene Flipse, Jr., Miss Mildred W. Barnes and Dr. Maxwell Finland, of Boston City Hospital and Harvard Medical School, (*Journal, American Medical Association,* Nov. 17). The studies were made with the collaboration of Miss Ruth Drew and Miss Alice Northrop.

Penicillin, like the sulfa drugs, had little or no effect on the rash and "strictly toxic" phase of the illness.

Injections of the mold chemical into the muscles, however, banished the hemolytic streptococci of scarlet fever from the patients' noses and throats within 48 hours. If the treatment is continued, the original types of these germs do not reappear. This means that after seven days of treatment the patient is no longer a carrier of the germs and consequently no longer a danger to others. The week of penicillin treatment which banishes the germs is also believed to be effective in preventing complications of scarlet fever.

Penicillin sprayed into the nose and throat four to six times a day has very little effect on the germs in the throat though it seems to keep the nose free of hemolytic streptococci while the treatment is being continued.

Sulfadiazine given by mouth for seven days, the Boston scientists found, suppresses the number of hemolytic streptococci during the period of treatment only.

The studies were made on 36 scarlet fever patients ranging in age from four to 15 years. They were divided into groups of nine. One group was given sulfadiazine, one group penicillin by intramuscular injection, one group penicillin nose and throat spray, and the fourth group was given the usual scarlet fever treatment without sulfa drugs or antibiotics.

Science News Letter, November 24, 1945

CHEMISTRY

Zinc-Containing Fungicide Claimed to Be Superior

➤ A NEW chemical weapon useful in defense against the fungi that cause plant diseases has been prepared by chemists of E. I. du Pont de Nemours and Company, and will be ready for use by the opening of another crop season. It has been given the trade name "Zerlate"—short for zinc dimethyldithiocarbamate—and is claimed to be more effective than long-used fungicides based on copper and sulfur against certain plant diseases. A close chemical relative, which contains iron instead of zinc, is already in use under the name of "Fermate."

Zerlate combines readily with DDT and other insecticides, so that the same dusting or spraying can be used to combat both fungi and insect pests. It also has repellent action against some insects when used alone; one application is said to protect peaches against Japanese beetles for from seven to ten days.

Science News Letter, November 24, 1945

MEDICINE

Anti-Pellagra Vitamin For Malarial Headache

➤ TRIAL of nicotinic acid, the anti-pellagra vitamin, as a remedy for malarial headache is advised by Lt. Comdr. Meyer A. Zeligs, of the Navy Medical Corps. (*Journal, American Medical Association,* Nov. 17)

This headache is the most common and most disturbing symptom afflicting servicemen with chronic malaria during the interval between attacks of the disease, he found from experience at the Marine Barracks, Klamath Falls, Ore.

The patient usually wakes up with the headache which gets better after he has been up a few hours. Exercise, especially in the hot sun, however, almost always brings on severe headache. If the headache persists for a prolonged period, the patient may develop mild mental depression and seclusiveness, loses interest, and cannot stand physical exertion.

The reason for trying nicotinic acid in these cases is that this chemical dilates the blood vessels and enhances the flow of blood to the brain. A tendency for red blood cells containing malaria parasites to become "sticky" has been observed in patients dying of malaria of the brain. This stickiness might slow the flow of blood to the brain even in less severe cases and cause the headache, Dr. Zeligs reasoned. Nicotinic acid might counteract this.

The vitamin chemical relieved the headache in 10 out of 25 cases, he reports, and caused moderate improvement in seven, with no benefit in eight. Because it is a safe drug and no other remedy has been effective in relieving malarial headaches, Dr. Zeligs suggests that it be given further trial.

Science News Letter, November 24, 1945

ELECTRONICS

Electronic "Eye" Has Long-Range Detection

See Front Cover

➤ INFORMATION provided by radar's electronic eye is marked down on a vertical chart in the radar plot room of an Essex-class carrier during strikes against Japan early this year. Behind the transparent expanse of the giant circle, other enlisted men work on other aspects of the incoming flow of information. Official U. S. Navy photograph.

Science News Letter, November 24, 1945

ASTRONOMY

Total Lunar Eclipse

Some of the most brilliant stars in the heavens are visible during December, including the planets, Saturn and Mars. Eclipse of the moon is on the 18th.

By JAMES STOKLEY

➤ WITH DECEMBER bringing the typical evening skies of winter, we now have visible some of the most brilliant stars in the heavens. To these are added this December, right in the middle of the brightest of these orbs, two bright planets. And in addition, on the evening of Tuesday, Dec. 18, there will be a total eclipse of the moon, making the celestial menu for the month an unusually good one.

To the southeast is the brightest star in the night-time sky—Sirius, the dog star, in Canis Major, the greater dog. Its magnitude in the astronomers' scale is minus 1.6, though its brightness is now somewhat reduced because we see it low in the sky.

Directly above Canis Major, Orion, the warrior, is visible. This, perhaps the best known of all constellations after the Great Dipper, is recognized by reason of the three stars in a row which form Orion's belt. Above the belt and to the left is Betelgeuse, and at about the same distance in the opposite direction is Rigel, another star of the first magnitude.

Saturn Visible

About as high as Rigel and almost directly east is the lesser dog, Canis Minor, in which bright Procyon stands. And above Canis Minor are Gemini, the twins. It is in this group that one of our planets, Saturn, is seen. The two brightest stars in Gemini are Castor and Pollux, whose positions are indicated on the accompanying maps. These depict the appearance of the skies at 8:00 p.m. standard time, on Dec. 1, and 9:00 p.m. on Dec. 15.

The usual appearance of Castor and Pollux in the constellation is altered this month by the presence of the planet Saturn below and to the right, so that the twins temporarily seem to be triplets! Saturn, of magnitude zero, is considerably brighter than Pollux, which in turn exceeds Castor.

Still more brilliant is the second of our planets, Mars, which is just below Saturn. Its magnitude is minus 0.7, nearly twice as bright as Saturn. If this is not enough to distinguish Mars, there is also its characteristic red color. And on the evening of Dec. 21, at 7:05 p.m., EST, the moon passes close by, about two lunar diameters to the south.

A third planet is visible later in the night. About 2:00 a.m., around the middle of the month, Jupiter, with magnitude minus 1.4, nearly the same as that of Sirius, appears in the east. At sunrise it is on the meridian.

Exceeding any of these stars or planets in magnitude, with minus 3.4, is Venus but it is not well placed to view as it is only a little above the southeastern horizon at sunrise. A glimpse of it may be obtained if the sky is quite clear. Near it, on Christmas morning and a day or two after, Mercury, which is farthest west of the sun on the 26th, may be seen as well. It rises then about an hour and three quarters before the sun.

On Dec. 22, at 12:04 a.m., EST, winter begins. This event is called the winter solstice. The sun, which has been traveling southward through the sky since June, reaches the end of its path, and after this moves northward again. Because it is so far south, this is the shortest day of the year in the northern hemisphere. In the southern hemisphere it is the longest day—and the beginning of summer.

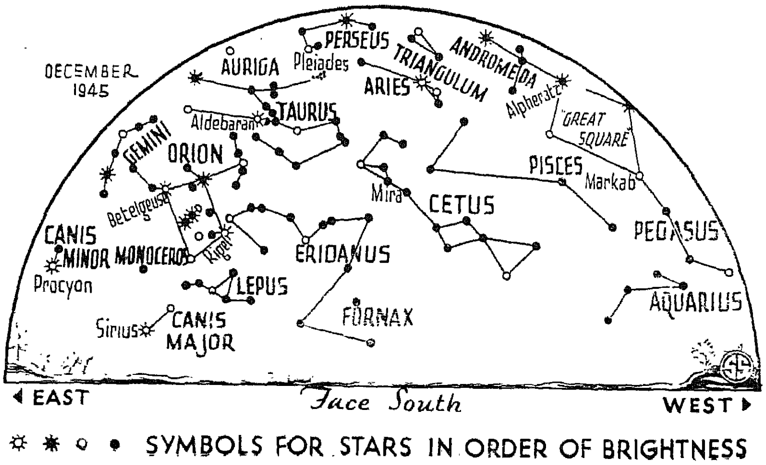
When, on the evening of Dec. 18, the moon goes through the shadow of the earth producing a total lunar eclipse, it will be the first seen generally in the United States since August, 1942. It is not, however, the first eclipse in that period, for last July there was one of the sun, caused by the moon's passing between the sun and earth. This was total in some parts of the northwestern United States and Canada, and partial over nearly all of the two countries.

The shadow of the earth, like that of the moon, has two parts. The core, or umbra, is the conical region where the sun is completely hidden by our planet. Outside this is a larger region, the penumbra, from which the sun would only be partly covered.

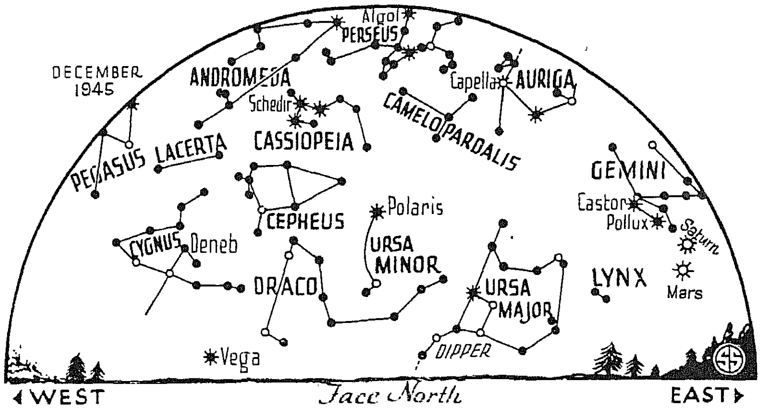
Eclipse on the 18th

On the evening of the 18th the moon enters the penumbra at 6:30 p.m. EST, but nothing will be visible until it is almost ready to enter the umbra, which it does at 7:37. The northeastern edge of the moon is the first to go into the inner shadow. As it advances farther, the shadow will be visible creeping across the moon's face, its curvature attesting to the roundness of the earth. At 8:40 p.m. the eclipse is total, with the moon completely in the shadow.

When this happens the moon does not completely vanish, even though it is completely cut off from the sun's direct light. The reason for this is that the atmospheric layer around the earth acts as a prism, bending some of the sunlight into the shadow. Passing through the air, the blue rays in this light are scattered—producing the blue color of the daytime sky. With blue removed, the residual



☼ ✱ ○ • SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS



light is redder than normal, and so the moon, during a total eclipse, has a coppery red color.

At 10:00 p.m. the moon starts to emerge from the umbra, and at 11:03 is out of it completely, the last bit to be shaded being at the western edge. At two minutes after midnight, EST, the moon is out of the penumbra as well and the eclipse is entirely over.

In westerly parts of the country, the eclipse occurs earlier in the evening but even on the Pacific coast, where the end of the total phase comes at 7:00 p.m., PST, it will still be visible, since the evenings now are the longest of the year, because of the early sunset.

Celestial Time Table for December

Dec.	EST	
1	3:00 p.m.	Moon farthest, 252,400 miles
3	4:21 a.m.	Moon passes Venus
4	1:06 p.m.	New moon
7	4:00 p.m.	Uranus nearest, 1,694,000,000 miles
12	Early a.m.	Meteors of Geminid shower visible
	6:05 a.m.	Moon in first quarter
	10:00 p.m.	Mercury passes Venus
14	2:09 a.m.	Algol (variable star in Perseus) at minimum
16	10:58 p.m.	Algol at minimum
17	8:00 a.m.	Moon nearest, 224,100 miles
18	11:17 p.m.	Full moon—total eclipse of moon
19	7:48 p.m.	Algol at minimum
20	4:17 p.m.	Moon passes Saturn
21	7:05 a.m.	Moon passes Mars
22	12:04 a.m.	Winter commences
26	3:00 a.m.	Moon in last quarter
	10:00 a.m.	Mercury farthest west of sun
27	4:18 p.m.	Moon passes Jupiter
29	6:00 a.m.	Moon farthest, 251,800 miles

Subtract one hour for CST, two hours for MST, and three for PST.

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METEOROLOGY

Jobs for Weather-Men

The American Meteorological Society will help those discharged from the armed forces in their hunt for civilian jobs.

➤ YOUNG weather-men now receiving their discharges from the Armed Services will be helped by the American Meteorological Society in their hunt for civilian jobs along the lines of their special talents and training. Need for a placement service of this kind is sharpened by the fact that whereas there were about 500 trained forecasters and weather analysts before the war, special training programs to meet the sudden emergency needs have now swelled their number to something between 5,000 and 10,000.

Whether all these new meteorologists can be absorbed into civilian meteorology will have to depend to a considerable degree on developments in post-war industry and business. If civil aviation enjoys the rapid development that many expect, a considerable proportion of the young war-trained weathermen will find jobs there. Other types of business may be able to offer some jobs, though as a rule only after some additional specializing training. Although considerable interest in obtaining meteorological service has been expressed in business circles, relatively few firms have directly indicated a willingness to provide actual jobs themselves.

Probably the greatest number of openings will be in government service. The Weather Bureau can take on some men, and such agencies as TVA, the Geological Survey, the Army Engineers, etc., will find places for more, especially for those who can qualify in the special branch known as hydrometeorology.

Additional places may be found on the faculties of colleges and universities. Few institutions offered courses in meteorology before the war, but at least part of the many that added them to the curriculum after Pearl Harbor may want to retain them. In some instances there may not be enough teaching work in meteorology to keep a full-time instructor busy, but courses in weather science may be combined with instruction in mathematics, physics or other related subjects to make a fulltime job.

A detailed review of the situation, with suggestions for young meteorologists seeking jobs to follow, is given in the *Bulletin of the American Meteorological Society* (Sept.).

Science News Letter, November 24, 1945

INVENTION

Several Glass Sheets Inspected at Same Time

➤ QUICK inspection of a dozen or more large sheets of glass at the same time is made possible by a simple device on which U. S. patent 2,388,789 has been issued to L. I. Louviaux of Toledo, Ohio.

A common source of trouble in sheet glass, the inventor explains, is the type of flaw known as a ream. This is a small smear or gob of unhomogeneous glass within the sheet, having a different index of refraction from that of the rest of the glass. Inspection of glass sheets one by one does not always find the reams.

In Mr. Louviaux's invention, the glass sheets are stacked up on edge, nearly vertically, on both sides of a rack known as a buck. Into the narrow A-shaped space between the two stacks a frame carrying lamps and a reflector can be thrust. The inspector, looking at the stack from the outside, can see if there is a ream in any of the sheets, and by moving them one at a time isolate the faulty sheet and discard it.

Science News Letter, November 24, 1945

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Do You Know?

Frozen berries stored four months showed a 50% loss of vitamin C.

Larvae of *crabs* are called zoea, meaning "life".

The largest *mercury mine* in the world is the Almaden mine in Spain, which has been operated for over 2,000 years.

The *cotton boll weevil* came from Mexico by way of the southern corner of Texas in 1892 and spread over the cotton-raising country at a rate of about 60 miles a year.

Tannin, used to transform animal hides into leather, is brewed from the bark of certain trees and from tannin-bearing shrubs and leaves, in a process similar to brewing tea.

Synthetic *gum benzoin* now compares favorably in purity and cost with the Siamese natural product; it is used to fix the odors of incense, skin soaps, perfumes and other cosmetics, and in certain pharmaceuticals.

Electronic tubes can control the amount, direction and speed of an electric current, change alternating to direct current or direct to alternating, amplify it into greater power, and change it into radio or X-rays.

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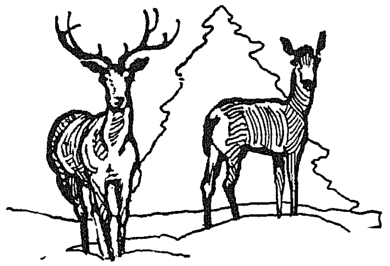
WILDLIFE

NATURE RAMBLINGS

by Frank Thone



Fat Measures Health

➤ FAT IS a good index to the general physical condition of deer in the winter, it has been demonstrated in field studies by Dave Harris of the South Dakota Department of Game and Fish, with headquarters at Deadwood, S. D. The less fat you find on a wintering deer, the nearer it is to starvation.

Deer come to the beginning of winter with considerable reserves of fat, stored in various parts of their bodies during their long summer of browsing. The carcass of a deer shot in autumn will have a layer of fat under almost all parts of its skin, with thicker masses on hips, saddle and elsewhere. There will be a great deal of fat around the internal organs, even a spot of fat on the heart. The marrow in the long bones will be white with fat.

As the summer browse-plants are banished by the onset of winter, the deer turns to less appetizing and less nourishing foods. These may fill the stomach, but they make no fat, and the animal begins to use up its reserves.

First to go are the outside layers and masses of fat—the deer loses its late-summer roundness, becomes more angular in outline. Later in winter, especially if the snows are deep and even winter browse is hard to get at, the hunger-pinch becomes more severe and the internal reserves are drawn upon. The carcass of a winter-killed deer will show very little visceral fat; and if the fat-spot on the heart is gone it is a pretty sure sign that the animal was really starving.

Indication of extreme distress is the disappearance of fat from the bone marrow. Deer in the final stages of malnutrition will have nothing in the long-bone cavities but a kind of red jelly.

Mr. Harris gives details of his studies in a report published in the *Journal of Wildlife Management,* (Oct.)

Science News Letter, November 24, 1945

PARASITOLOGY

Lice Bother Cattle Less In Summer Than in Winter

➤ CONTRARY to what might be expected, cattle lice are less troublesome in summer than in winter. Studies by agricultural scientists at Cornell University suggest that summer heat is the answer.

In the barn the skin temperature of a cow stays down around 90 degrees Fahrenheit, but when she goes out into direct summer sunlight her hide may have a surface temperature as high as 125 degrees. No louse can stand such hot weather for long. They all die except a few hardy and well protected stragglers who take refuge in the cow's ears, or on some continuously shaded area on her underside.

These few manage to hold on until the herd goes back into the barn in the fall. Then they begin to raise big families, and by mid-winter they are grandparents in a big way.

Science News Letter, November 24, 1945

CHEMISTRY

Adhesive Made from Yeast By High Temperatures

➤ YEAST, cultivated on waste sulfite liquor from paper and wood-pulp mills, can be made into a high-grade adhesive by heating it to between 160 and 220 degrees Fahrenheit, states Eric W. Eweson of New York City, who has obtained patent 2,388,910 on his process. There is enough sugar in the waste liquor to feed the yeast, and lignin, usually also present, adds adhesive value. Another source of raw material for this process would be yeasts spoiled for other purposes through over-age or moldiness.

Science News Letter, November 24, 1945

A *robin,* it is reported, made her nest on top of a brake cylinder under a passenger railroad car that made a 136-mile daily round trip; each evening she found the car and occupied the nest for the night.

The Southwest Pacific long-tailed *cuckoo* is one of the most remarkable migrants in the world; it nests in New Zealand and migrates to the Pacific equatorial islands when winter weather approaches the south.

Who is the most unusual person on your *Christmas List?*

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GEOLOGY

International Problem

Nations that need oil most, except America, have only minor natural resources. Commission should allocate petroleum products to countries needing them.

➤ THE IMPORTANCE of oil in world economy is indicated by proposals under discussion at the London Anglo-American conference, particularly the idea of an international commission to deal with present and future problems concerning the development of old and new reserves and the allocation of the petroleum products to the countries needing them. The nations that have the greater needs for petroleum, except the United States, have only minor domestic reserves, if any, and even American needs may soon require oil imports because of war drains and future expanded uses.

Atomic power may some day replace some of the present-day power-creating fuels, but not in the immediate future. Even if atomic power is used in the larger power plants, petroleum will be needed for many decades for diesel engines, heating plants and to operate automobiles. The world supply is ample for many years, and oil and gasoline can be made from oil-shale and coal.

However, the process is not simple, and nations depending upon synthetic fuels for their war equipment might find themselves at the mercy of those with natural supplies, as Germany and Japan now know. In addition to fuels, lubrication greases for machinery are essential to operation, and most of the greases found satisfactory for this purpose are petroleum products. Petroleum chemicals are also important, but many of these can be made from coal.

The United States, in the past, has worried very little about its supply of oil. The situation has changed, however, as a result of the war, during which America provided about two-thirds of the needed oil to power not only American fighting equipment but that of the other Allies as well. Known reserves have been drawn on heavily. New reserves may be located, and better recovery methods developed to get a larger percentage of the crude from under the ground, but the United States must look forward to possible importation.

The importance of oil in world economy becomes apparent by a survey of the countries using it and the regions where it is mined. The industrially developed nations are the greater users, but, with the exception of the United States, they are only minor producers. Western Europe, for instance, mines very little petroleum, but needs much. Soviet Russia seems to have plenty for its own need, and Romania produces for export. Production in Poland, Czechoslovakia, Germany, France and England is very small. Australia and Brazil are other countries undergoing rapid industrial development which now rely almost wholly on imported mineral liquid fuels.

The principal oil-producing nations in the Western Hemisphere are the United States, far in the lead, together with Venezuela, Mexico, Colombia and Trinidad. Northern Alaska has oil reserves now under development which soon may play an important part in the American supply.

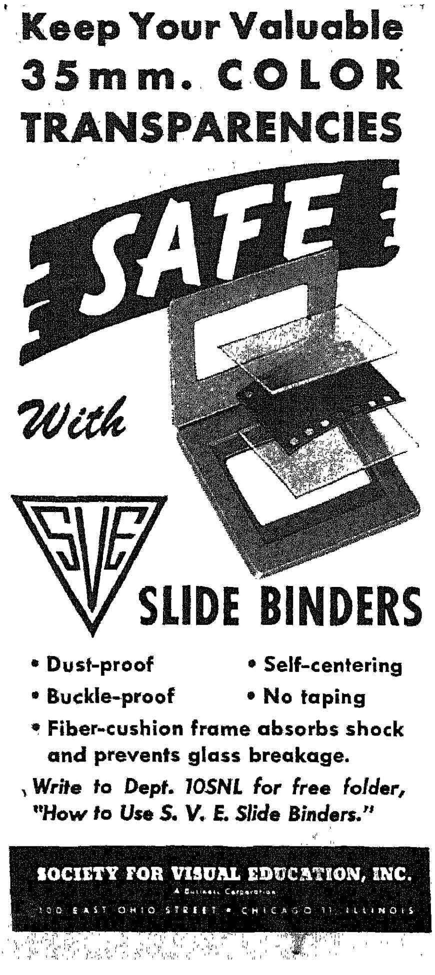
Africa produces very little oil at present, the principal production being in Egypt. An American oil company has just secured oil concessions in Ethiopia, an indication that its geologists, from preliminary studies, believe that important reserves may be found.

The Netherlands Indies, particularly Sumatra, Java and Borneo, are rich sources of oil and in the future will play an increasingly important part in the oil industry. Relatively little exploration has been carried out in this vast Netherlands area so the full possibilities are as yet unknown.

Asia has vast quantities of known oil, particularly in the Arabian-Iran region. Burma is also important and both China and Japan produce some. Sakhalin island, off the coast of Siberia, was a Jap source of oil in prewar and early war years. The Middle East fields in Arabia are particularly rich, one American authority stating that these fields are incomparably richer than those in this country.

"The really rich areas in oil as proved by drilling," Robert E. Wilson, president of the Pan-American Petroleum and Transport Company, stated recently in an article in *Mining and Metallurgy,* "are in the large basins alternately lifted and depressed between major continents—the Caribbean area, including our Gulf Coast, Venezuela, and Colombia; the great area between Europe and Asia, which has the tremendous reserves of Arabia and Iran; the intercontinental area of the Netherlands Indies between the continents of Australia and Asia; and finally, the area around the Arctic ocean, in northern Russia and around Alaska, which may prove a rich area but which, because of physical difficulties, has not as yet been explored."

Science News Letter, November 24, 1945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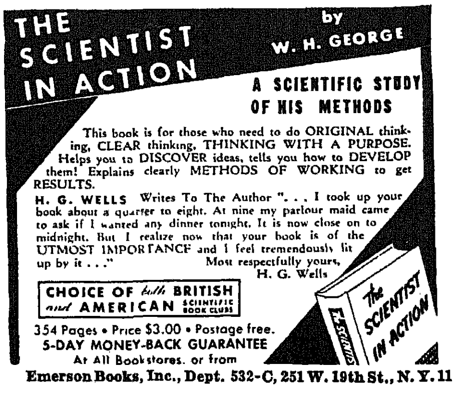
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Books of the Week

➤ IMPROVED methods of navigation, up-to-date information concerning the internal constitution and age of the earth; and new observations of the planets and their satellites are included in the revision of ASTRONOMY, Vol. I, by Henry Norris Russell, Raymond Smith Dugan and John Quincy Stewart of the Princeton University Observatory. (*Ginn*, $3.)

Science News Letter, November 24, 1945

➤ VIRUSES are still much-disputed things; it is not even fully agreed whether they are living organisms or remarkably lifelike, complex, but non-living protein molecules. Dr. Frank M. Burnet regards them as living, and so presents them in VIRUS AS ORGANISM. It may be a good thing that virus particles are all but invisible, since this does away with the temptation to concentrate on their morphology and leaves a study of their behavior as the only practical avenue of approach. This avenue Dr. Burnet exploits fully, with close observation and shrewd deduction on virus evolution, physiology, host-relations and general ecology. (*Harvard Univ. Press*, $2.)

Science News Letter, November 24, 1945

Just Off the Press

ACTIVE PSYCHOTHERAPY—Alexander Herzberg—*Grune*, 152 p., $3.50.

AMERICA'S INDIAN BACKGROUND—Edwin F. Walker—*Southwest Museum*—19 p., with tribal map, 30 cents.

AMPUTATION PROSTHESIS—Atha Thomas, M.D., and Chester Haddan—*Lippincott*, 291 p., illus., $8.

THE CALENDAR STICK OF TSHI-ZUN-HAU-KAU—Robert H. Merrill—*Cranbrook Inst. of Science*, 12 p., illus., 35 cents.

EVERYDAY PROBLEMS IN ECONOMICS—May Wood-Simons—*American Technical Society*, 544 p., illus., $3.50.

FLUOROCHEMISTRY—Jack De Ment—*Chemical Pub. Co.*, 796 p., $14.50.

FUNGICIDES AND THEIR ACTION—James G. Horsfall—*Chronica Botanica*, 239 p., $5.

THE HERBAL OF RUFINUS—Lynn Thorndike—*Univ. of Chicago Press*, 475 p., $5.

HOLLYWOOD QUARTERLY—*Univ. of Calif. Press*, 129 p., $1.25 per issue, Vol. 1 No. 1. New magazine presenting the record of research in motion pictures and radio for a clearer understanding of their social, educational and aesthetic functions.

THE IROQUOIS: A STUDY IN CULTURAL EVOLUTION—Frank Gouldsmith Speck—*Cranbrook Inst. of Science*, 94 p., illus., $1.

THE LOST WOODS: ADVENTURES OF A NATURALIST—Edwin Way Teale—*Dodd*, 321 p., illus., $4.

THE NATURE OF COSMIC RAYS—W. F. G. Swann—*Sky Publ. Corp.*, 31 p., illus., 50 cents.

THE NEWSPAPER: ITS MAKING AND ITS MEANING—by members of the staff of The New York Times—*Scribner*, 207 p., $2.

THE PSYCHOLOGY OF SEEING—Herman F. Brandt—*Philosophical Lib.*, 240 p., illus., $3.75.

RACE AND DEMOCRATIC SOCIETY—Franz Boas—*J. J. Augustin*, 219 p., $2.50.

THE ROLE OF THE AGED IN PRIMITIVE SOCIETY—Leo W. Simmons—*Yale Univ. Press*, 308 p., $4.

VOLCANOES DECLARE WAR—LOGISTICS AND STRATEGY OF PACIFIC VOLCANO SCIENCE—T. A. Jaggar—*Paradise of The Pacific, ltd.*, 166 p., illus., $3.75.

"YOUNG MAN, YOU ARE NORMAL"—Earnest Hooton—*Putnam*, 210 p., illus., $2.50.

Science News Letter, November 24, 1945

MEDICINE-PHOTOGRAPHY

Easy-to-Use Camera For Surgical Operations

➤ A NEW aid to the surgeon who wants to record pictorially the details of a new operation or technic but who has no expert photographer at his service was demonstrated for the first time at the meeting Nov. 12 to 15 of the Southern Medical Association in Cincinnati.

It consists of an easily operated, high-speed camera developed by the Army's Pictorial Service for the Surgeon General's Office. Black and white or color still pictures on 35 mm. film can be taken indoors and outdoors at distances of from six inches to 12 feet. Every phase of the picture-taking except focussing and clicking the shutter is automatic.

The camera was devised from an idea originally conceived by Capt. Rollin W. King and Emanuel Berlant. It weighs approximately 5½ pounds, is operated from a portable electric power pack, which weighs approximately 27 pounds, and it may be plugged into any ordinary current line.

The camera contains its own built-in light source, a coiled circular quartz vapor discharge tube. The tube, designed and constructed by the General Electric Company, gives a flash of approximately 1/25,000 of a second duration, too short a period of time to harm the eye.

The device has been used by the Medical Corps to photograph open eyes at close-up ranges. It is estimated that the flash tube is capable of withstanding the strain of 50,000 flashes, each of which, at its peak intensity, is brighter than sunlight. The brilliance of the flash is so great that the surrounding general illumination of the subject need not be taken into consideration.

Due to the extremely rapid flash discharge, the camera has a phenomenal motion-stopping ability, which is capable of "freezing" the whirring of a moving fan blade.

Four models of the camera are now in existence, and others are being developed.

Science News Letter, November 24, 1945

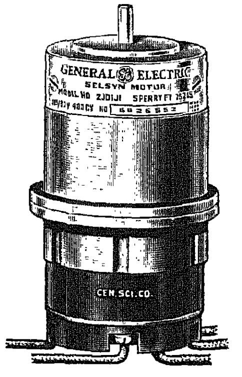
CHEMISTRY

Acid Treatment For Pulp Production

➤ TWO SWEDISH inventors, A. J. A. Asplund of Alsten and J. W. Holst of Stockholm, offer a new process for digesting straw and other cheap cellulose materials for the production of paper pulp. Instead of employing the time-honored alkaline sulfate or acid sulfite processes, they use dilute sulfuric or other acid, under steam pressure, and follow the chemical digestion with appropriate mechanical beating, washing, etc. Rights in their patent, No. 2,388,592, are assigned to Aktiebolaget Defibrator, a Swedish corporation.

Science News Letter, November 24, 1945

The *loon* is the champion bird diver and swimmer.



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⚙ *DISPOSABLE toothbrush, for one-time use in railway and bus stations, and other places, has a flat, rigid handle made of a material that softens and sufficiently disintegrates in water to be deposited safely in the toilet after use. Its tiny brush is impregnated with a dentrifice.*

Science News Letter, November 24, 1945

⚙ *WEDGE-SHAPED rain gauge, made of a transparent plastic, is graduated on one rectangular face so that water-level readings may be taken without the use of a measuring rod.*

Science News Letter, November 24, 1945

⚙ *CEREAL TOASTER, to restore crispness to breakfast foods, is a narrow metal box with perforated sides that fits into the bread space of an ordinary electric toaster. After the cereal is properly heated, the container is removed by an insulated handle.*

Science News Letter, November 24, 1945

⚙ *ILLUMINATED electric flatiron has a slightly projecting metal cover with downward-curved edges under which several tiny lamps are placed. The light from the lamps is reflected to the edges of the ironing surface.*

Science News Letter, November 24, 1945

⚙ *HEALTH LAMP for humans and poultry emits a combination of germ-killing and health-giving radiation. Its action depends upon a new chemical phosphor, shown in the picture, a fluorescent powder used on the inside wall of a tube that converts some of the germicidal waves from a mercury discharge lamp into ultraviolet rays.*

Science News Letter, November 24, 1945

⚙ *COMPOUND screw, for use in wood, has a threaded shank of two or more sections of different diameters instead of the uniformly tapering shank. The lower, pointed section may be without threads so that it can be driven into the wood with a hammer.*

Science News Letter, November 24, 1945

⚙ *ASH REMOVAL and shifting device, by the turning of a crank, draws the ashes out of a furnace, sifts them, and dumps the ash dust and partially burned coal into separate containers. An endless screw, similar to that in the familiar kitchen meat grinder, forces the ashes forward from a trough fixed under the grate.*

Science News Letter, November 24, 1945

⚙ *COMB, for use by barbers in cutting hair, has every second tooth about half the length of the others, and every second space between the teeth deeper than between the others. This comb permits a three-way cut to be made with one stroke, it is claimed.*

Science News Letter, November 24, 1945

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Question Box

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What is "racon"? p. 327.

HYDROPONICS

Where is the new soilless garden located? p. 327.

MEDICINE

How may the quarantine period of scarlet fever be reduced? p. 329.

What may make it possible to manufacture streptomycin instead of relying on extraction from living organisms? p. 325.

What new malarial headache remedy has been suggested? p. 329.

What two anti-malaria drugs have now been announced? p. 329.

What types of influenza is the new vaccine effective against? p. 323.

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TECHNOLOGY

What are "anhydrous" vegetables? p. 328.

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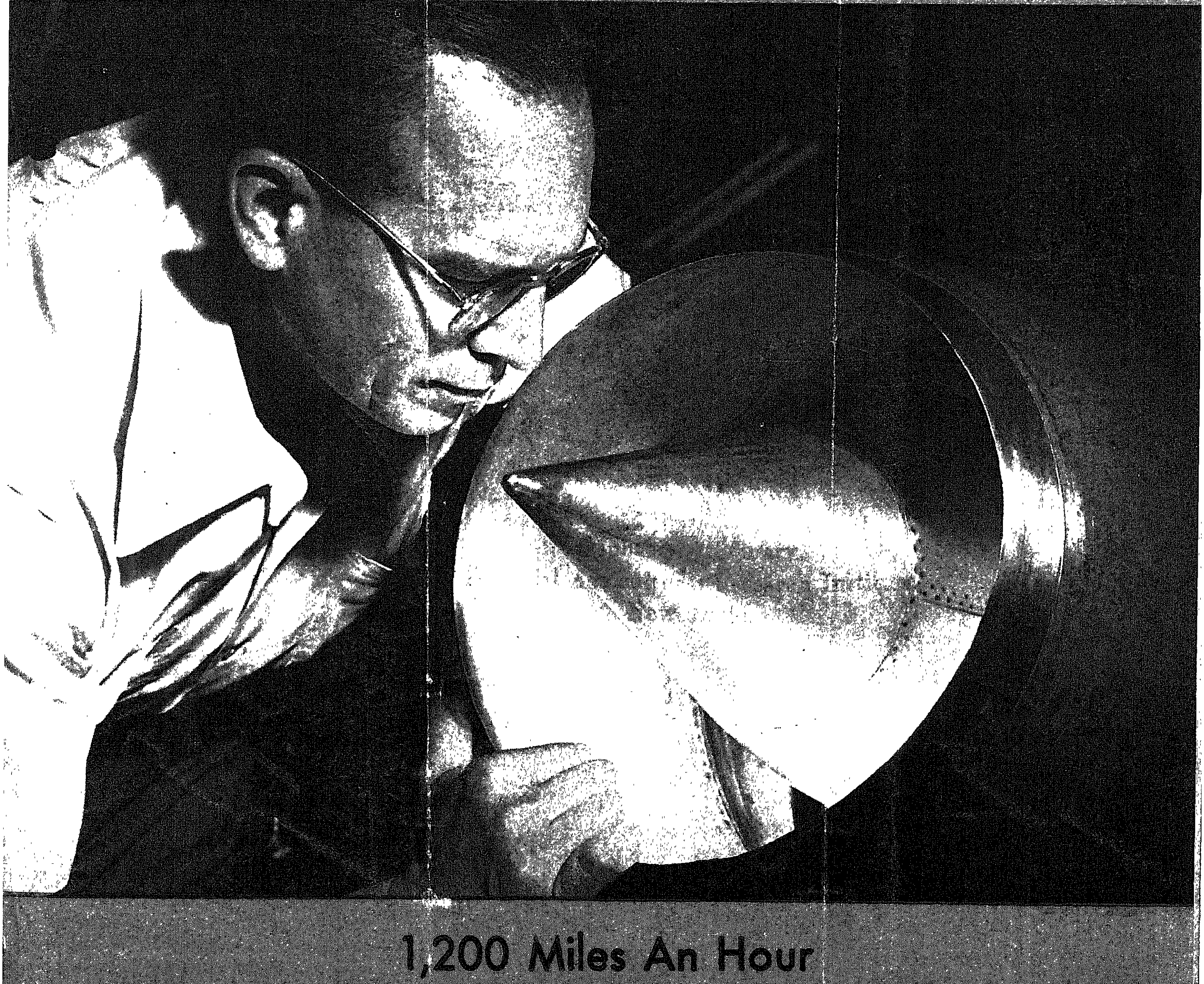
THE WEEKLY SUMMARY OF CURRENT SCIENCE • DECEMBER 1, 1945



1,200 Miles An Hour

See Page 343

A SCIENCE SERVICE PUBLICATION

MEDICINE

Arsenic Poison Remedy

Alcohol that removes poisons from the body is now announced by the British. Hundreds saved through application by U. S. scientists.

➤ MORE THAN 200 patients poisoned by arsenic in the course of treatment for syphilis have been saved in the United States by a special alcohol first developed by British scientists and made even more widely useful through research in this country.

There is hope that the same saving of lives may be accomplished in cases of mercury poisoning, such as occurs in use of bichloride of mercury in suicide attempts.

The alcohol that is more than an antidote for arsenic and probably mercury poisoning is 2, 3 dithiopropanol. A closely guarded secret during the war, this chemical has been known only as BAL, (British anti-lewisite).

Its identity is now revealed by the biochemist whose 20 or more years of painstaking research between two wars resulted in its development. This is Prof. R. A. Peters of Oxford University. His report in *Nature,* (Nov. 24), will be followed shortly by reports in the United States of the work of American scientists during the war.

BAL, the anti-arsenic chemical, was developed for use in local decontamination of the skin after lewisite poisoning. Lewisite, war gas developed by an American scientist, is an arsenic-containing chemical.

When the British shared the secret of BAL with American military and scientific authorities, scientists in the United States proceeded first to confirm the British findings and then to develop a practical ointment for use on the skin and in the eyes in case of lewisite poisoning. This was necessary because BAL itself is very unstable in water solution and some means of preserving its stability until it would be used was needed.

The very specific nature of the alcohol's action on arsenic in the skin, suggested that it might be useful in cases in which arsenic had reached other tissues in the body, for example, in patients suffering toxic reactions from arsenicals used in treatment for syphilis.

American scientists next devised a method for using it in such cases. The method was to put up the alcohol in peanut oil and methylbenzoate. In this form it is stable and can be given by hypodermic injection.

Ampules of this form of BAL were distributed to all rapid treatment centers of the U. S. Public Health Service, where syphilis patients were getting large doses of arsenicals. From these centers records of more than 200 cases treated with BAL show that it is effective in counteracting arsenic poisoning. The failures are believed to be instances of too little or too late. The chemical was not given in large enough dosage or was given too late to help the patient.

BAL's action is much more than that of an antidote. Antidotes merely take up whatever poison has not been absorbed by the tissues of the body before the antidote is given. BAL actually removes the poison from the tissues by forming a compound with the arsenic which the body can excrete.

Under the microscope scientists have seen germs "killed" by arsenic come back to life when BAL is put on them.

BAL itself has poisonous properties but these are not so great that it cannot be safely used if proper precautions regarding dosage are followed. It has been distributed to many doctors all over this country for scientific investigation. Manufacture for civilian distribution is planned but the chemical may not be available for several months.

Science News Letter, December 1, 1945

MEDICINE

Poison Gas Research Points to New Remedies

➤ NOT ONLY can patients threatened with arsenic and mercury poisoning be saved from death, others whose eyesight is endangered by glaucoma, those afflicted with the muscle weakness disease called myasthenia gravis, and even sufferers from the mental illness, schizophrenia, may in future be restored to health as a result of chemical warfare research.

These benefits from the search for new, more potent poison gases and for methods of combatting those that might be used against us are reported by Maj. Oscar Bodansky, M.C., of the medical division of the Chemical Warfare Service at Edgewood Arsenal. (*Science,* Nov. 23.)

Myasthenia gravis and glaucoma patients may some day be grateful for the fact that British chemists, searching for new poison gases, investigated a chemical that might be popularly termed a nerve poison gas. One such selected for study caused excessive contraction of the pupil of the eye. It was hoped this chemical might be an effective weapon because it might make it impossible for a man to see well enough to shoot accurately.

As a chemical warfare agent it turned out to be a dud, but study of its action showed that it checked the activity of a body enzyme to an unprecedented degree. This enzyme is cholinesterase. Present treatment of both glaucoma and myasthenia gravis involves the use of prostigmine and physostigmine, substances which are believed to check cholinesterase activity.

The chemical warfare agent, not identified in Maj. Bodansky's report, checks this enzyme's activity for a much longer time, however, than prostigmine does. Studies are now under way to determine how effective it may be in treating glaucoma and myasthenia gravis and whether an even more effective chemical can be developed.

Successful search at Edgewood for a chemical to counteract the effects of hydrocyanic acid gas led to reinvestigation of the effects of cyanide on brain activity and the possibility of developing a successful chemical treatment of the mental disease, schizophrenia. Maj. Bodansky does not state in his report that such a treatment for schizophrenia has been developed, but that a program for exploring the possibilities is now under way at one of the neuropsychiatric centers in this country.

The glimpses he gives of benefits to come from research at Edgewood and elsewhere on the medical aspects of chemical warfare show the importance of fundamental research. The work, he points out, "did not consist of haphazard, disconnected attempts" to find substances which might prove useful in treating gas casualties. It did consist of a systematic search for basic information.

Science News Letter, December 1, 1945

Mealy, dry perfection in *baked potatoes* is obtained by starting the baking in a hot oven and letting them bake at about 400 degrees until thoroughly done.

A seed supply of 20 pounds of a new variety of *sorghum* in 1941 was pyramided to produce 32,000,000 pounds of grain in 1944.

MEDICINE

Cholera Cure

Blood plasma, sulfadiazine and salt solution were used in controlled experiments in India, Navy medical officer reports.

By FAITH BREWER

Former American Red Cross Staff Correspondent in India

➤ Discovery of what is described as "a complete cure" for one of mankind's oldest and most deadly enemies, cholera, was made by U. S. Navy epidemiologists in a controlled experiment held during a recent epidemic in Calcutta, India.

Begun as a protective measure for thousands of Americans stationed in India, China, Burma, Ceylon and the Philippines, where annually the disease rages in epidemics, the experiment has resulted in a new step forward for medical science. Where before there was only vaccination against this dread disease, and that not a sure-fire preventive, there is now tested knowledge that through the proper use of blood plasma, sulfadiazine, and saline solution, "no one need die of cholera."

Where previously 30% to 80% of all cholera victims died, 100% recovery is assured through this new treatment, according to Comdr. Julius M. Amberson, MC, USN, officer in charge of the experimental unit, now in Washington.

Dramatic description of the effects produced by this combination of plasma and drugs was first given me shortly after the history-making Epidemiology Unit No. 50 first came to Calcutta in June of this year.

The Burning Ghats or funeral pyres were then piled high with bodies of Hindus who had died of cholera. The American scientists became familiar with the sunken eyes, pinched noses, and anxious expressions of the victims. They learned to recognize the signs: shrunken "washerwoman" hands and feet, feeble rapid pulse, a fever, constant diarrhea and vomiting which leaves the body dehydrated, toxic absorption which causes muscular cramps and collapse.

While the majority of the cholera victims came from the poorer, less educated classes, it also strikes the homes of the richest. No respecter of class, age, sex, or race, the epidemic struck down 3,335 people in Calcutta from Jan. 1 through June 16, 1945. Of these 1,192 died. Only a few Americans, who were civilians, contracted the disease, and only one, an American Negro pianist, died. Fifteen British military residents of the Grand Hotel in Calcutta were stricken and one died.

All American military were bombarded with radio reminders and posters exhorting them to "eat only at Army messes or Red Cross clubs, eat no raw fruits or vegetables, drink no unapproved water, and renew your vaccinations!" Because of this excellent preventive campaign, no death among the American military personnel was reported during that epidemic. But, hardly had this epidemic reached its peak when another broke out in Chungking, China.

Comdr. Amberson radioed the procedure which his experimental unit had already determined to be highly successful to the Navy Surgeon General, Vice Admiral Ross T. McIntire, who gave this new medical news not only to the American medical units there, but also to their allies, the Chinese. A plane loaded with plasma, sulfadiazine, and saline solution went over the "Hump" to save the lives of hundreds.

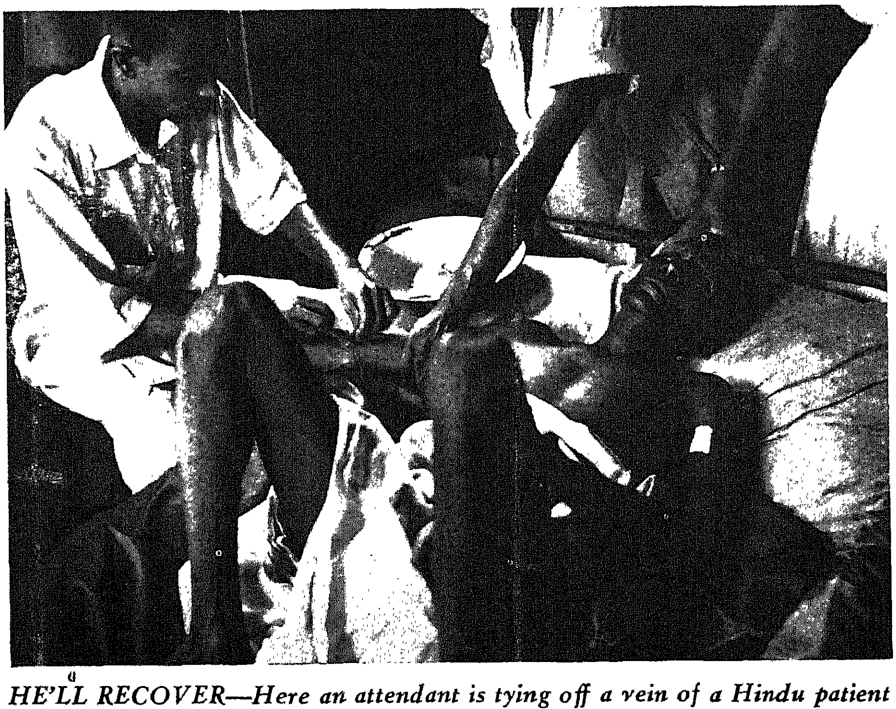
Of the 400 cases in Calcutta selected by the Navy epidemiologists for their experiment, one group was treated with sulfaguanadine, one with sulfadiazine, one with penicillin, and one with sulfadiazine and penicillin combined.

In laboratory experiments it had been determined that these drugs worked against the cholera organism. But in humans, the onset of the disease was so sudden and severe, with circulation slowed down because of dehydration and loss of blood serum, the valuable drugs could not be mobilized rapidly enough to make the battle an equal one. Because of the great concentration of red blood cells which would not circulate, gangrene set in in the feet and hands of the victims.

Comdr. Amberson conceived the idea of using blood plasma to thin out the thick, jelly-like consistency of the cholera-infected blood, and help the patient's body perform its normal functions while the sulfadiazine got in its good work.

As soon as the plasma was pumped into the collapsing veins of a Hindu dying of cholera, the pulse in the bony brown arm grew stronger. His lids opened, and his hazy black eyes began to focus, as he opened swollen lips to whisper huskily for "Panee!" "Panee!" (Hindustani for water.)

Eight or nine days later, the cholera



HE'LL RECOVER—Here an attendant is tying off a vein of a Hindu patient preparatory to giving an injection. Official U. S. Navy photograph.

victim, who would have been on a funeral pyre within 12 hours had he not received this treatment, walked out of the hospital, completely cured.

In summing up the results of the experiment, Comdr. Amberson says in his report which will be published in December issue of the Naval Medical Bulletin:

"From results of the tests made by our Epidemiology Unit No. 50, we recommend:

"That sulfadiazine plus adequate quantities of salines and supportive therapy be accepted as the treatment in mild and uncomplicated cases of cholera.

"That this treatment be supplemented with penicillin in cases of moderate severity, especially where pneumonia is a complication.

"That plasma plus salines be administered in sufficient amounts to elicit a rapid clinical response in severe cases of shock or circulatory failure, and that this be continued long enough to mobilize the effect of the penicillin or sulfadiazine."

Only two of the cases treated had previously had cholera inoculations. In both the onset was sudden but the symptoms were mild, and both were discharged after three or four days treatment. This led Comdr. Amberson to observe that "cholera vaccine is of value in lessening the severity and duration of illness. Death is almost certain without treatment. Chemotherapy and saline solution alone will lower the expected death rate, and with the additional use of plasma, the recovery of every cholera victim can be assured."

Science News Letter, December 1, 1945

ELECTRONICS

Static Partly Conquered

➤ HOW the Army and Navy working together attempted to decrease flying hazards caused by what technical men call "precipitation static," which prevents radio communication between aircraft and ground, is no longer a military secret. No simple solution to the important problem has been found, but scientific investigation has given means of reducing the hazard and also a practical approach which is expected to lead to a realization of complete success in the immediate future.

Much radio and navigational equipment fails to operate when the pilot needs it most, during bad weather. The loss of communication may be for 10 to 15 minutes, which usually is not a serious matter. In certain weather the aviator may be without communication for hours. Under these conditions navigation is impossible and flying is hazardous.

Two main types of precipitation static are recognized. One is when a plane is flying through dry crystalline snow that puts a tremendous free electrical charge on it and causes the plane to break into a corona. The other is encountered when a plane flies near thunder clouds or in the vicinity of lightning. In this case corona is produced on the outer edges of the airplane and interferes seriously with radio, navigation and communication.

A joint Army-Navy committee was established in 1943 to find means to combat radio interference or precipitation static. The committee undertook the development of equipment suitable for the discharging of the accumulated electrostatic charges. This led to the development in the Naval Research Laboratory of an early type of wet-wick discharger, later superseded by a dry type requiring practically no attention.

These dischargers, mounted on the outmost surfaces of the airplane, are employed to keep the voltages below or close to the electric field for corona. In this way the radio interference on the plane is reduced. Improvements in the design of the antennae and radio circuits have been made and these, in conjunction with other developed equipment, will play an important part in the reduction of precipitation static.

Science News Letter, December 1, 1945

AERONAUTICS

High-Speed Airplanes May Be Rubber-Coated

➤ SMOOTHER surfaces for the super-high-speed airplanes now coming into use are an imperative necessity. The thousands of rivet-heads and other minor projections that cover the naked metal surfaces of present-day wings, fuselages and control areas are recognized as a power-eating nuisance; and as speeds go up such sources of parasitic drag become simply intolerable.

To overcome this, Earle C. Pitman of Red Bank, N. J., has invented a method for coating aircraft surfaces with rubber having a very smooth outer surface. The metal is first covered with a strong cement, over which a layer of sponge rubber is applied. Moderate pressure and some heating in a mold makes it stick and also expands it. Then a layer of fabric is laid over the sponge rubber, and on top of this a final layer of dense rubber is cemented.

On this invention Mr. Pitman has been granted U. S. patent 2,389,210, which he has assigned to E. I. du Pont de Nemours and Company.

Science News Letter, December 1, 1945

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CHEMISTRY

Chemistry Nobelist

The 1945 award goes to Prof. Artturi Virtanen of Finland who has done practical work in cattle nutrition as well as research on capture of nitrogen by plants.

➤ PRACTICAL barnyard science and highly important basic investigations on how plants turn air into food have been combined in the research career of Prof. Artturi I. Virtanen, director of the Biochemical Institute at Helsinki, Finland, to whom the Nobel Prize in Chemistry for 1945 has been awarded.

Probably more people in the highly cow-conscious lands around the Baltic would recognize his name as the originator of the A. I. V. method of making silage than would know him as the discoverer of several important steps in the nitrogen synthesis by legumes. Yet the two are linked together, just as some of Pasteur's fundamental researches had practical tie-ups with such practical matters as brewing and silkworm culture.

Being interested in how proteins were made out of nitrogen captured from the air by bacteria on pea and clover roots, Prof. Virtanen was also interested in how the same proteins were broken down and destroyed by other bacteria. This led to a study of how silage spoiled when it was permitted to become alkaline, with the eventual loss of protein in the form of ammonia. He stopped such spoilage by wetting down the fresh fodder, as it was packed into the silo, with a weak solution of hydrochloric acid. Silage thus treated kept very well, and the physiological effects of the residual acid were offset by adding a little ground limestone and soda at feeding time. This is the foundation of the A. I. V. method. It is widely used in the dairy regions of Europe, though it has not been adopted to any great extent in the United States.

Prof. Virtanen's researches on the capture and utilization of nitrogen from the air in food formation in plants have led to some interesting discoveries. He found that the root-nodule bacteria sheltered by legumes do not necessarily feed their captured nitrogen directly to their hosts, but excrete into the soil considerable quantities of one of the essential building-blocks of the proteins, aspartic acid, which the host-plant is able to use. He found also that the bacteria could live without the support of a higher plant, but that they throve better and captured more nitrogen if they had it. He also uncovered evidence that higher plants can capture nitrogen directly themselves, without the aid of root bacteria.

In other researches Prof. Virtanen proved that higher plants could take up and utilize relatively complex organic compounds from solution in the soil. This ran counter to the doctrine, quite generally accepted for a hundred years or more, that such organic compounds have to be decomposed by soil microorganisms into simpler substances, which are then taken up by the plants and rebuilt into complex compounds.

In experiments with Dr. Synnove von Hausen, Prof. Virtanen found that plants' growth could be greatly stimulated, and their flowering and fruiting made earlier and more abundant, by feeding their roots with a yeast extract.

Science News Letter, December 1, 1945

PHYSICS—CHEMISTRY

Atom Bomb Nobelists

The 1944 chemistry award goes to Prof. Otto Hahn of Berlin; Prof. Wolfgang Pauli gets 1945 physics award for theoretical studies on atomic structure.

➤ AWARD of Nobel prizes to two European atomic scientists, one of them a German, emphasizes the importance to scientific progress of free interchange and publication of scientific information.

Prof. Otto Hahn of Berlin, who has been given the 1944 chemistry Nobel prize, may be, as rumored, in the United States among the German scientists brought to this country in the custody of the U. S. Army.

His researches reported in January, 1939, on the fission of the uranium atom with energy release, were actually the beginnings of the gigantic research project that resulted in the atomic bomb. His scientific reports, along with those of Dr. F. Strassmann, co-author with Prof. Hahn of the famous Die Naturwissenchaften paper, and observations of Dr. O. R. Frisch and Dr. Liese Meitner, both then refugees from Germany, caused the nuclear physicists of the world to start striving for the practical release of atomic energy.

Prof. Hahn's researches were published in the leading scientific journal of Germany, despite the fact that Nazi Germany was then only a few months away from war.

Prof. Wolfgang Pauli, now visiting professor at the Institute of Advanced Studies at Princeton, N. J., who has been awarded the 1945 physics Nobel prize, was born in Vienna, studied at Munich and until 1940 was at the Technical College in Zurich, Switzerland. His theoretical studies on atomic structure have contributed to advances in physics, among them the release of atomic energy.

He is best known for the exclusive principle that bears his name. In a story issued in 1933, Science Service explained this principle as "rugged individuality of electrons."

This article said:

Smith, Jones, Brown, White: these are the Anglo-Saxon world's commonest names. They all contain five letters.

The five letters in the name are not sufficient to classify them, but physicists can distinguish between the 92 identical electrons in the uranium atom family by having five labels for each little mite of electricity, and no two of these little fellows have the same five letters attached to them.

These tiny particles of electricity or matter, the electrons, are very standard uniform fellows and always have the same weight and quantity of electricity when they are alone, but if they are attached together to make up an atom they begin to exhibit individuality. The tags placed on any one of them by the scientist give his address within the atom and tell how far he lives from the center of the community.

The name given to the statement of this individuality is the Pauli exclusion or equivalence principle, which was formulated by the eminent physicist, Prof. W. Pauli, early in the development of the new wave mechanics. This states that there are never two or more equivalent electrons in the same atom, such that the values of all five of their quantum numbers will be identical when a strong magnetic field is applied.

The Pauli exclusion principle is essentially a statement of the rugged individuality of electrons and the impossibility of promoting a merger between them.

Science News Letter, December 1, 1945

GEOLOGY—BACTERIOLOGY

Bacteria and Petroleum

Bacteria may have played many important roles in the formation of deposits as well as have had something to do with the relative scarcity today.

➤ BACTERIA may have had a number of important roles in the formation and development of the earth's petroleum deposits, Dr. Claude E. ZoBell of the Scripps Institution of Oceanography stated in a lecture before a Washington scientific audience. They may also have had something to do with the relative scarcity of petroleum today, he added, for it seems likely that much more oil has been formed in the long course of geologic history than is now present in the rocks, and it is known that some species of bacteria can feed on petroleum and related compounds, unlikely though they may seem as food materials.

There is little direct evidence that bacteria helped to make oil, Dr. ZoBell admitted. However, laboratory experiments have given a number of very interesting clues, some of which are being followed intensively in the hope of throwing more light on this most difficult and baffling geologic riddle.

If bacteria did aid in producing oil, it was probably a highly complex process as well as a very long one. As many as 40 or 50 different kinds of bacteria may have been involved.

Most geologists now believe that petroleum formation started with the dead plant or animal materials. These, of course, are always subject to bacterial action. One of the things that happens to such organic remains is the bacterial removal of elements other than carbon and hydrogen, especially sulfur, phosphorus and nitrogen. The nearer organic remains come to consist of carbon and hydrogen alone, of course, the nearer they are to being hydrocarbons, which are the constituents of petroleum and natural gas. This general observation receives some backing from the known fact that bacteria can convert dead organic remains into the simplest of hydrocarbons (methane), and also some of the most complex of hydrocarbons (bacterial pigments), as well as a few other compounds of intermediate complexity.

Another thing that certain bacteria may have done toward oil formation is hinted at in the activity of some species in releasing quantities of hydrogen from organic compounds. Addition of hydrogen to carbon under heat and pressure (hydrogenation) is a standard method for manufacturing synthetic oil out of coal or lignite. Bacteria-freed hydrogen, under the heat and pressure conditions in the earth's crust, may have been added to buried carbonaceous deposits in a similar manner, Dr. ZoBell suggested.

The role of bacteria was not necessarily limited to the formation of oil, Dr. ZoBell continued. Other bacteria may have had a good deal to do with the loosening of oil from films coating soil and rock particles and its accumulation into pools. If the particles are of limestone, acid-forming bacteria can dissolve them altogether, leaving pores and channels through which the released oil can flow. Production of carbon dioxide, both through the dissolving of limestone and as a result of the microorganisms' own life processes can do several things: it makes the oil less viscous, so that it will flow more freely; it directly pries the oil films loose from the particles to which they cling; it can form pressure-bubbles in dead-end pockets and drive out the oil that has accumulated in them.

Bacteria are known to be able to feed on various kinds of hydrocarbons, ranging from the simple methane to the highly complex paraffin waxes, and including all varieties of petroleum products. They require water and certain mineral salts, but use the hydrocarbons as their sole energy foods. It is for this reason that Dr. ZoBell suggested that bacteria may have in the course of geologic ages destroyed vast oil pools that other bacteria had vital parts in forming.

Present-day bacterial appetities for oil and related compounds work both beneficially and harmfully, from the human point of view. Oil pollutions of the soil, near oil wells and where oil has spilled from broken pipe lines or wrecked tanks, do not last long, Dr. ZoBell pointed out. Bacteria clean them up, and as a rule leave the soil more fertile than it was before the pollution occurred. Similarly, but more slowly, bacteria clear up oil pollution on bodies of water.

Bacteria have been known to attack kerosene, releasing explosive gas mixtures. Deterioration of high-octane gasoline during the North African campaign was traced to bacteria present in the water at the bottoms of the tanks. Bacteria also made a lot of trouble, for a time, in non-leak gasoline tanks of airplanes by attacking the synthetic rubber linings, which are made from hydrocarbons derived from petroleum or natural gas.

Finally, bacterial fondness for petroleum constituents has been used as a sure-nosed means in oil prospecting. Several of the lighter, more volatile petroleum constituents, especially ethane, propane and butane, diffuse upward toward the earth's surface, and where they do, the special kinds of bacteria that feed on them will accumulate in the soil. By hunting for them, and especially by hunting for fossil evidences of their long-continued presence, new oil pools may be found.

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CHEMISTRY

Insoluble Soap Useful as Lubricant

➤ A MIXTURE of three kinds of soap which most people would never recognize as soaps at all is the basis for patent 2,389,523, issued to Dr. Frank A. Leyda of Berkeley, Calif. The ordinary sudsy soaps of bathroom and kitchen are compounds of either potassium or sodium with fatty acids, usually stearic or palmitic acids. When used with too-hard water, a flocculent precipitate, slippery but insoluble, sometimes comes out. This also is a soap—a calcium stearate.

To the housekeeper, such an insoluble soap is a plain nuisance, making troublesome rings in the bathtub or washbowl, but to the mechanical engineer metallic soaps of this kind are often very valuable greases. The grease on which Dr. Leyda has obtained his patent is a mixture: barium, calcium and magnesium compounded with stearic and palmitic acids.

Patent rights have been assigned to the California Research Corporation.

Science News Letter, December 1, 1945

AERONAUTICS-ENGINEERING

More Jet Engines

Peacetime military fleet of 15,000 and 3,500 commercial planes assures large gas turbine aircraft industry. Two jet engines shown for first time.

See Front Cover

➤ PEACETIME production of gas turbine aircraft engines—jet and propeller drive—will rapidly become dominant in the high powered and high speed airplane fields, both military and commercial, George H. Woodard of the Westinghouse Electric Corporation stated.

Military air fleets totaling about 15,000 planes will be required for the maintenance of national security, while civil transport planes may number 3,500 within the next five years. Power will be derived for these planes not only from the usual reciprocating engines but from gas turbine engines as well, Mr. Woodard declared.

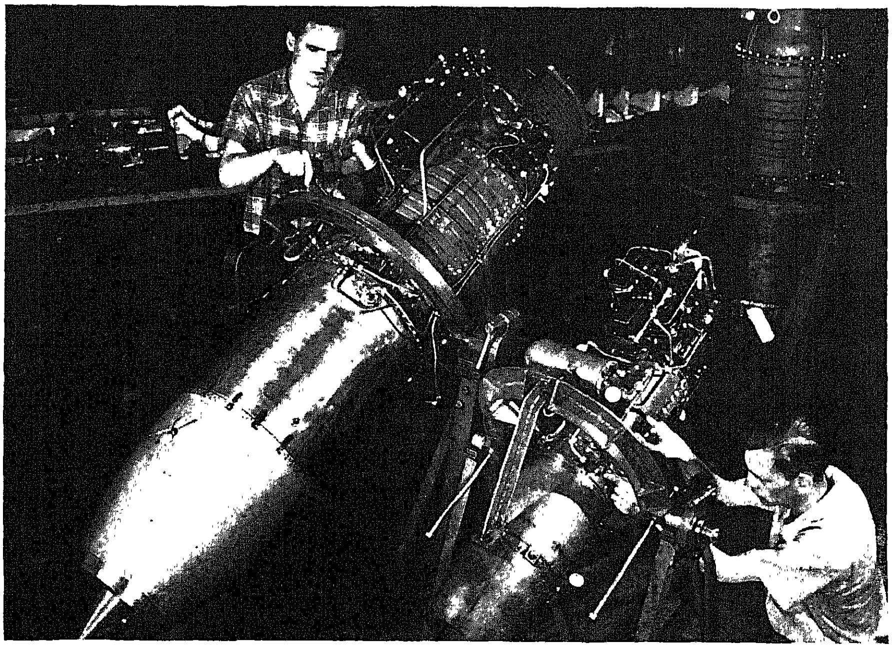
At a demonstration where two of the torpedo-shaped, axial-flow jet propulsion gas turbine engines were shown for the first time, it was learned that an American "buzzless" buzz bomb had been designed to use a nine-and-a-half-inch diameter turbo-jet powerplant. The "Yankee," a small, high powered engine, was installed in the Navy's fastest plane, but later engines, still military secrets, are considered substantially better for weight and power. Through the jet orifice, shown on the front cover of this Science News Letter, a sizzling 50-ton-an-hour blast of combustion gases streams at more than 1,200 miles an hour to give the engine its propulsive thrust.

Although jet engines were the main concern during the war the gas turbine with propeller drive will be of even greater importance for peacetime needs. High powered and high speed planes will use the turbine type engines while the reciprocating engine will remain dominant in small and medium-sized planes.

Jet engines will be used exclusively when speed is important above all other considerations. Propeller-drive gas turbines will be used in planes operating up to 550 miles an hour when high power combined with efficient operation is required.

Mr. Woodard predicted that gas turbine engines of 5,000 to 8,000 horsepower will be practicable within the next few years. Jet propulsion will be important but the useful power from a gas turbine's combustion gas will mainly be used to drive a propeller.

Science News Letter, December 1, 1945



BIG AND SMALL—The jet engine on the left was designed to power Navy combat planes, the "baby" one on the right was originally designed to power an American version of "buzzless" buzz bomb. Some version of this engine may see service as a power source for aircraft cabin supercharging, wing de-icing and driving helicopters.

ARCHAEOLOGY—GEOLOGY

Mexican Expedition Seeks Early Evidence of Man

➤ STUDY of chronological records antedating historic pottery periods is the main objective of a geological and archaeological expedition headed by Dr. Hellmut de Terra, now at work in the region of the Valley of Mexico.

The investigation is being carried on under a grant from the Viking Fund, Inc., of New York and in collaboration with the Carnegie Institution of Washington. Dr. de Terra was recently appointed temporary research associate of the Institution so that the geological studies might be correlated with development of human industry in that region.

Previous investigations in the Valley of Mexico suggested glacial and postglacial formations on the slopes of the famous Mexican mountain, Popocatepetl. The present investigations will attempt to gain a clearer idea as to the age of the basin underlying the Valley. In the course of the work early Pleistocene or recent remains of human industry may be found.

It is hoped that such discoveries will determine what relationship there is between the early evidences of man in that region. Footprints discovered in Nicaragua by an earlier expedition indicated a much earlier human occupancy of the area than was before supposed. Such evidence may be substantiated by the investigations now going on.

Information may be forthcoming as a result of this expedition which will also connect human developments in the Valley with our own Southwest. Archaeologists and anthropologists have long been interested in such a tie-up. They may soon have an answer to this baffling question.

Science News Letter, December 1, 1945

GENETICS

Chromosome Behavior Clearly Seen in Nematode

➤ WORMS promise to open up a new field of investigation into problems of living cells, thanks to a student's luck in a laboratory procedure.

The behavior of chromosomes, the rod-like bodies within the cells which are the basis of the phenomena of heredity, was easily and clearly seen in the eggs of the worm, Nematospiroides dubius, on a slide prepared by Marjorie Ind, her teacher, Ll. Lloyd of the University, Leeds, reports in the British scientific journal, Nature. Now the zoologist need no longer go to plants for the demonstration of the division of the nuclei of living cells.

Very little is known about the chromosomes of nematode worms, in spite of the classical example of one kind, Ascaris. Therefore, a study of the cell division will be more important than that of the complete, complex cell division (mitosis) because it shows features not shared by the Ascaris.

Science News Letter, December 1, 1945

PHYSICS

Scientific Meeting Devoted to Atomic Energy

➤ THE NATION'S leading scientists had on their program for two days nothing but atomic energy, its details and its consequences. Limited in their technical discussions by what the War Department desires to announce, the international pronouncements about atomic power and atomic bombs have become as much a part of the scientific program as what the scientists themselves said.

Many members of the American Philosophical Society and the National Academy of Sciences, among them the physicists and chemists who made the atomic bomb, felt that the program set forth by President Truman and Prime Ministers Attlee and King has logical premises but that the step-by-step operation proposed is to tentative and too subject to failure.

The major problem is whether there shall be war in the future or whether there shall not be. The first step in the Truman-Attlee-King program, the exchange of scientific information for peaceful use, would in normal circumstances be a good beginning. But the atomic bomb has created a situation which is, as Dr. J. Robert Oppenheimer, recently director of the Los Alamos atomic bomb project, described before the scientists, "a vast threat, and a new one, to all the peoples of the earth."

"By its novelty, its terror, and its strangely Promethean quality," Dr. Oppenheimer continued, "it has become, in the eyes of many of us, an opportunity unique and challenging."

The greatest human problem today and the greatest scientific problem today, at the end of a great war, is to prevent a more terrible war. Dr. Oppenheimer expressed the feelings of the scientists at the meeting when he said that there will be difficult days ahead, beset with discouragement and frustrations, but that the making of the necessary changes in relations between nations and peoples will not be impossible. This is the fundamental problem of human society. It is a pre-condition, as Dr. Oppenheimer put it, not only for civilized life and freedom but for the attainment of any living human aspiration.

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GENERAL SCIENCE

Five-Point Program Proposed at London

➤ ENCOURAGEMENT and coordination of scientific research and teaching on the broadest scale are called for in the charter of the Educational, Scientific and Cultural Organization of the United Nations (UNESCO), the first meeting of which has been concluded in London.

Scientists attending the conference have informally proposed to the science division of UNESCO's preliminary committee such problems as the following:

1. Bibliographic coverage of fields at present not receiving adequate handling on an international basis.
2. Promotion of wide international interchange of scientific personnel at all levels, including students, teachers and investigators.
3. Maintenance of bureaus for scientific surveys and censuses; for example, a survey of what is needed for the restoration of devastated countries, and a study of standards basic to scientific education.
4. Financial assistance for existing scientific organizations.
5. Organization of "cross-field" international conferences of social and natural scientists to consider problems raised by atomic energy, new labor-saving devices, new kinds of food, and population shifts.

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IN SCIEN

ORDNANCE

Anti-Sub Rocket Weapon Revealed for First Time

➤ THE "HEDGEHOG," a multiple rocket launcher used against submarines, has been released from wartime wraps by the Navy. Officially designated as Anti-Submarine Projector, Mark 10, it consisted of a bristling array of 24 big rockets carrying heavy charges of high explosive.

When the approximate location of a submerged U-boat was plotted, all 24 of the missiles could be launched in two and one-half seconds. They fell in an elliptical pattern in the target area and immediately sank, nose down.

Unlike the conventional "ash-can" depth charge, these weapons would explode only on direct contact with the target. Thus, if the listening devices picked up the "bump" of an underwater explosion the commander of the attacking ship knew positively that a hit had been scored.

The "hedgehog," originally a British invention, was adopted and improved by the U. S. Navy, and used with great effect in breaking up the German "wolf-pack" U-boat campaign.

The weapons were manufactured in this country by the Carrier Corporation at Syracuse, N. Y.

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PHYSICS

Awards Given Military Men for Atom Work

➤ FOR THEIR PART in making the atomic bomb, 54 officers so far have received military decorations and 52 awards are now announced by the War Department. Distinguished Service Medals awarded to Col. Franklin T. Matthias, Col. Kenneth D. Nichols, and Col. Stafford L. Warren have been announced. Maj. Gen. Leslie Richard Groves and Brig. Gen. Thomas F. Farrell had been given the award previously. Forty-nine other officers were given the Legion of Merit or the Oak Leaf Cluster to the Legion of Merit.

It is understood that equivalent awards and commendations will be given to an even larger number of civilians.

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CE FIELDS

ELECTRONICS

Electronic Heat Makes Bread Mold-Proof

➤ BREAD MOLD, which each year ruins 150,000,000 pounds of bread, is completely destroyed when the baked bread is heated electronically for five seconds, stated Dr. William H. Cathcart, head of the national bakery laboratories of the Great Atlantic and Pacific Tea Company.

Up to the present, certain chemicals added to bakers' formulas have merely retarded the growth of mold in bread and other baked goods. Mold spores can now be eradicated completely by exposing wrapped bread to high-frequency heat generated in an electronic "oven," Dr. Cathcart reported. The taste, physical characteristics and nutritive value of the bread are in no way changed by the electronic rays, which penetrate all portions of the bread simultaneously.

Bread given the electronic treatment remains completely unaffected by mold after three weeks under normal kitchen conditions of temperature and humidity, while mold appeared on untreated bread three days after the experiment was begun. Both batches of bread were made of the same ingredients with the usual mold retardants added.

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CHEMISTRY

Properties of Fibers Depend on Molecules

➤ THE INDUSTRIAL importance of textile materials stems from the diverse mechanical properties which the various fibers possess, and these properties depend upon the properties of the molecules in the fiber, stated Dr. Milton Harris at the Polytechnic Institute of Brooklyn, at a meeting devoted to the application of polymer chemistry to textile fibers. Dr. Harris is a member of the Milton Harris Associates, Washington, D. C.

Cotton, he said, is important because of its high strength which serves well in the production of industrial fabrics such as duck, webbing and tire cord, as well as clothing materials which must be subjected to frequent laundering. Wool is important because of its long-range elasticity, a property that confers on wool fabrics the ability to hold their shape or to maintain a porous structure which is closely associated with the warmth of fabrics.

Similarly, the importance of other fabrics, such as rayons, nylon and new fibers which are constantly appearing on the market, he continued, depends on specific mechanical properties which they possess.

These mechanical properties, Dr. Harris explained, depend on the length of molecules which go to make up the fiber, the manner in which these molecules are put together, and finally, their specific chemical structure. In this sense, the fiber bears the same relationship to its constituent molecules as a yarn bears to its constituent fibers. In other words, the property of a yarn depends on the length of its fibers, on the manner in which they are put together and the properties of fibers, such as flexibility, surface properties, etc.

The bearing of these molecular properties on the fiber properties was discussed by others at the meeting. Dr. A. F. Smith of E. I. duPont de Nemours and Company, Wilmington, Del., explained the influence of the manner in which the molecules are put together, and Dr. J. W. Seymour of the Celanese Corporation, Cumberland, Md., discussed the influence of the length of molecules on the mechanical properties of fibers and films.

Science News Letter, December 1, 1945

NUTRITION

November Cabbage Has Greater Yield of Vitamins

➤ CABBAGE harvested in November usually has a greater yield of vitamins—vitamin C, thiamin and riboflavin—than cabbage harvested in May. The vitamins are more evenly distributed through the head in fall than in spring cabbage, tests at the Southern Regional Vegetable Breeding Laboratory at Charleston, S. C., showed.

In May be sure to eat the outer leaves for they are much richer in vitamins than the inner leaves next to the core. In November, on the other hand, the inner leaves, next to the core, are richer in vitamins. As the season becomes colder, more vitamins accumulate around the center of the cabbage, but as the season becomes warmer, the vitamins are most abundant in the outer portions of the head.

Science News Letter, December 1, 1945

GENERAL SCIENCE

National Academy Names Award Winners

➤ DR. VANNEVAR BUSH, director of the Office of Scientific Research and Development, was awarded the Public Welfare Medal of the National Academy of Sciences in recognition of his outstanding service in bringing to bear the scientific and engineering talent of the country upon the problems of research connected with the war effort.

The Daniel Giraud Elliot medal for meritorious work in zoology or paleontology was this year awarded to Theodosius Dobzhansky, zoologist at Columbia University.

Science News Letter, December 1, 1945

TECHNOLOGY

Communication Possible At 40,000 Feet

➤ HIGH ALTITUDE communication, long a serious problem for our flyers, was overcome during the war, with development of a system that kept pilots and crew members of strato-flying airplanes in radio contact with ground stations and other aircraft, Brig. Gen. T. C. Rives of the Air Technical Service Command announced.

Operating at altitudes from 25,000 to 40,000 feet, where former sets had proven ineffective, this radio communication equipment helped make our B-29 raids over Japan successful. Featuring automatic tuning with pushbutton control through 11 different channels, the system overcame serious natural handicaps of high altitude flying.

At high elevations speech difficulties are great and it is only with this long-range transmitting liaison set that proper communication is possible. The set operates effectively at 40,000 feet, whereas the radio formerly used was capable of performance at heights not greater than 25,000 feet.

Any one of the frequency channels can be tuned in approximately 20 seconds after it is selected by pushing one of the corresponding buttons on the control box. Weight and space are saved. The new set weighs 110 pounds, compared with the 215-pound old set. It is compact in design and fits into a small space. Maintenance is facilitated with plug-in units that are easily removed and serviced separately.

The set provides for transmission of the spoken word by voice as well as by Morse code signals.

Science News Letter, December 1, 1945

MINERALOGY

Tricks with Minerals

They can expand, be shredded into silky fibers and woven into cloth, take their own photographs, make you see double and serve in other odd ways.

By MARTHA G. MORROW

➤ MINERALS are nature's favorite tricksters. Some minerals can be shredded into silky fibers and woven into cloth. Others slowly open out when heated until they are ten or twenty times their original size. Another can be made to take its own picture on a film negative.

One mineral is much harder crosswise than lengthwise. Another makes you see double. A third looks like a carefully carved cross. Amateur prospectors have been fooled into mistaking crystals of iron and sulfur for gold.

Pitchblende, the mineral from which radium and uranium are derived, will take its own photograph. When placed next to a piece of film, the mineral furnishes its own light and does the exposing by itself. The radioactive parts make spots on the film and thus record their formation.

Asbestos can be separated into innumerable fibers. There are two types of asbestos: amphibole asbestos, to which the name was originally applied, and serpentine asbestos, the type used chiefly in commerce today. Asbestos is ideal for fire-proofing and insulation. It will not burn and does not conduct heat well. The flexible fibers may be matted together or woven.

Every theater has an asbestos curtain that can be lowered to cut off a fire backstage. Firemen wear asbestos suits when they rescue people from burning buildings and flaming airplanes. Automobile brakes and clutches are lined with a woven asbestos fabric. Lower-grade, shorter-fibered asbestos and the waste from mining are made into shingles, slates, boards and other fireproof materials.

All forms of mica tend to split into thin sheets, but vermiculite is a special type that slowly opens out when heated. If a piece of vermiculite is held with a pair of tweezers, the heated mineral takes on brilliant, shining colors and fans out to many times its original size. When placed in a pan, the mica swells and curls into worm-like forms so that it actually seems to crawl.

"Sulfur diamond" is the name sometimes given to pyrite, a light, brassy-yellow mineral that amateur prospectors have occasionally mistaken for gold. This iron mineral is found in most parts of the world, and the bright cubes have been used in jewelry since the earliest times.

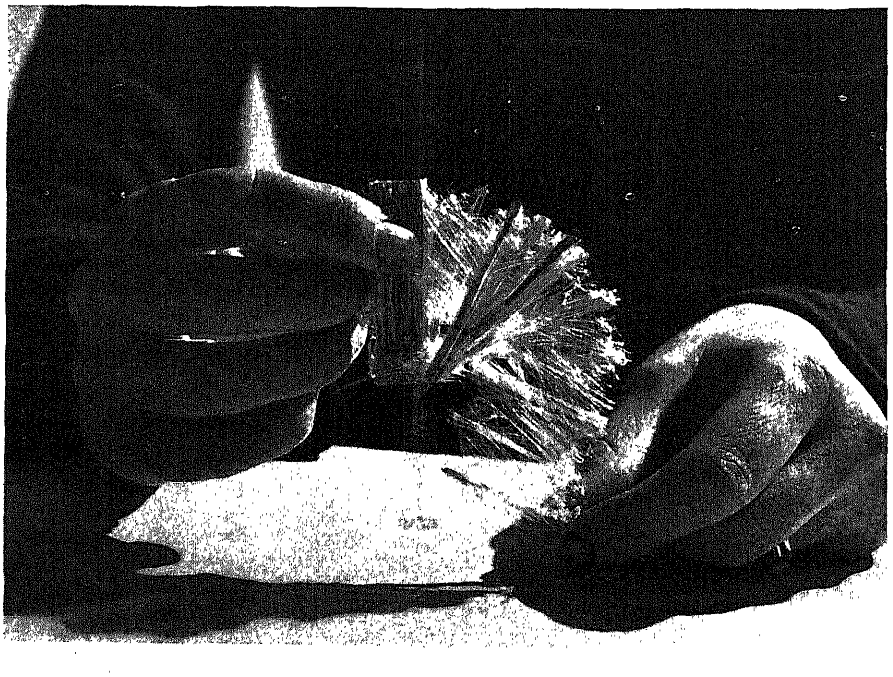
Pyrite is harder than ordinary steel, while gold may easily be scratched with a knife. In spite of being so abundant, pyrite is seldom used as an ore for iron, since the sulfur makes the metal brittle and is not easily gotten entirely out of the iron. Pyrite may be used in the manufacture of sulfuric acid, important to many of our industries, and also is a source of sulfur dioxide, used in the manufacture of paper pulp.

Kyanite, sometimes spelled cyanite, is a remarkable example of crystals that are harder in one direction than in another. Whereas you may leave a fairly distinct mark on the pearly-bladed crystals when scratching them lengthwise, in some cases no mark will be left at all when scratching the crystals crosswise. Blue, transparent crystals of kyanite are occasionally cut into gems. The common mineral is used for electrical porcelains and linings for all kinds of furnaces, fire pots and crucibles. It is also used in making tough glass, spark plugs and hotel ware.

Hematite, the most common of the iron ores, occurs in a number of forms. In its harder forms, fresh surfaces of hematite free from powder are steel-gray to iron-black in color. But when something harder is run across its surface, a cherry-red streak is left. In olden days it was known as "bloodstone" since the mineral, when finely ground and suspended in water, looks like blood.

The hard variety of hematite is not transparent except when sliced very, very thin. Then it appears to be blood-red when the light shines through it. It is used in making intaglios, where a design is cut into the stone.

Nails and paper clips may be picked up by another mineral, which acts as a natural magnet. Lodestone is a variety of magnetite, a compound of two iron oxides. It is usually found in rocks that



FIRE PROTECTION—Asbestos can be separated into silky fibers for fire-resistant clothing. Photograph by Fremont Davis, Science Service Staff Photographer.

have been heated, squeezed, and changed in the depths of the earth.

Nature's jackstones are the large twinned crystals known as staurolite. Some of the more perfect crystals simulate Roman, Maltese and St. Andrew's crosses. Dark brown in color, they may be as much as an inch in length.

You can see double with a crystal of Iceland spar. Owing to the strong double refraction of this pure type of calcite and the consequent wide separation of the two polarized rays of light passing through the crystal, an object viewed through the crystal appears double. It is used principally in such optical instruments as polarizing microscopes, photometers and others in which light is polarized.

Petrified wood that looks exactly like the trunks and branches of trees is not wood at all, but a form of quartz. It is formed by silica that slowly replaces wood, cell by cell, until no trace of the original organic material remains. So perfectly has the original structure been preserved that it is easy to identify the kind of tree the quartz has replaced and to tell its approximate age by the annual rings.

Another mineral, whose deposits vary with the season and the climate, is one that everyone has seen without recognizing it as a mineral. Ice, as much a mineral as quartz or mica or hematite, is a varied and beautiful crystal. In the form of snow, it is doubtful whether any two crystals in the history of the earth have ever been absolutely identical.

Science News Letter, December 1, 1945

If you would like to have samples of six tricky minerals, you can secure the Mineral Unit of THINGS of science, a kit prepared by Science Service, by sending 50 cents to SCIENCE NEWS LETTER, 1719 N Street, N. W., Washington 6, D. C., and asking for Things unit No. 61.

PSYCHIATRY

"Social Psychiatry"

A new science must be developed to treat the ills of nations and economic or other groups instead of just individual ills, Navy doctor predicts.

➤ A NEW AGE threatened by the wholesale destruction possible with the atomic bomb may require psychiatrists to develop a new "social psychiatry" to treat the ills of nations instead of just individuals, Capt. Francis J. Braceland, U. S. Navy psychiatrist, told a conference of the Sixth Service Command in Chicago. They may some day be treating the conflicts between capital and labor or between races or families.

Doctors, he said, may have to come out of their offices and hospitals to study the world in which their patients live, following the example of the atomic physicists who can no longer be thought of as devoting themselves exclusively to the cold calculations of their science now that they are publicly discussing the ethics and morality of atomic bombing.

This will require some adjustments on the part of the psychiatrists, Capt. Braceland warned his colleagues. One of their difficulties has been the tendency to operate in a vacuum.

"We have been able to have our patients adjust and apparently recover in our sanitaria," he said, "but they frequently have not been able to hold their gains in society."

Another difficulty is that what psychiatrists have learned about individuals may not apply at all in treating groups.

"It is unjustifiable to speak of a people as being 'schizoid' or a nation as being 'paranoid.' These are the symptoms of individuals. There are no data on record which indicate that we can transfer or translate our concepts of individual psychopathology to group psychopathology and formulate a workable system. Therefore, a whole new framework of reference and inquiry is required for the background of the social psychiatry of the future."

The complexities of modern society make its ills require the services of more than one group of specialists and call for the pooling of the resources of experts from many fields, Capt. Braceland said.

"Psychiatric meetings should be attended by other scientists such as economists, sociologists, philosophers and cultural anthropologists. Because of our isolation, we have become inbred and new ideas are looked upon with suspicion. Our meetings are the occasions to rehash old ideas. We write our books for one another and not for the people who would profit by reading them.

"It seems as though in our present manner of thinking and experimenting in this century that something has been left out or forgotten. Too little attention has been paid to the essential virtues, to the dignity and worth of man. The same thing has happened to nations that has happened to individuals—loss of mutual trust and loss of a sense of values. In individuals in general it seems as though it is not the basic truths which count any more. We are off on the periphery and interested in inconsequential things. If it were announced that one of the eternal truths would be discussed tomorrow morning, it would attract but little attention, but if it were announced that a thousand pairs of nylon stockings would go on sale in a certain store, they would have to bring out an extra detail of mounted police.

"It is certain that we will have to return again to the principles of first things first and a deep sense of individual responsibility and fundamental honesty before we can make strides toward either individual or international good will. It is these ordinary virtues which moor the individual securely when the gales are blowing. Every psychiatrist knows how difficult it is to treat a person who has no roots and nothing to tie to."

Science News Letter, December 1, 1945

Thorium, a radioactive element held by some as next in importance to uranium, has been found in India.

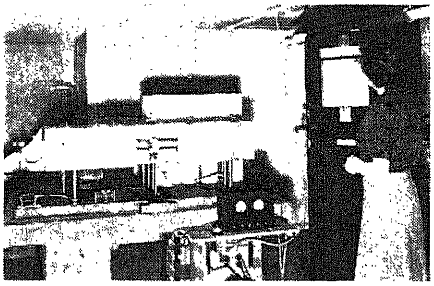


Photo courtesy Ohio State University

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Greek *sponge* fishing is at a standstill largely because of mine-infested waters.

During the past year 72 *sheep,* mainly purebred Merinos, were brought to the United States from New Zealand for breeding purposes.

Toredos, better known as *shipworms,* each year damage much timber in wharves; they can be killed, it is now found, by shock from dynamite explosions in the water between the piles.

Surplus *potatoes,* fed raw to cattle or cut up with hay for ensilage, stimulate milk production and cut down the amount of grain needed; four pounds of potatoes are equal to about one pound of grain.

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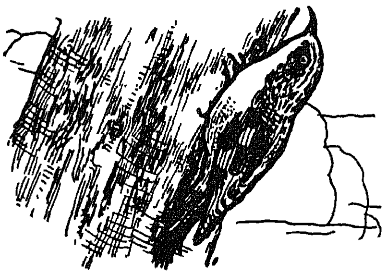
ORNITHOLOGY

NATURE RAMBLINGS

by Frank Thone



Winter Birds

➤ SUMMER BIRDS have long since vanished from their northern homes; even late-flying geese and ducks are seen only as stragglers. The birds, we say, have gone south for the winter.

However, there are plenty of birds in the North who do not go south for the winter, but come south from regions of even higher latitude. We commonly speak of them as winter birds—chickadees, juncos, nuthatches, and so on. To them our snowy woods are as much a winter haven and feeding ground as the palmier woods in lands where snow rarely or never falls.

What do they find to eat, now that there are no insects flying or caterpillars crawling? Well, their rations are not abundant, but they do manage to get along by dint of unceasing industry and patient prying into all sorts of crannies. There are lots of eggs and chrysalises tucked away in crevices and under flakes of bark on trees, as well as hibernating adult insects and spiders. That explains the minute inspection to which one tree trunk after another is subjected by spinsterish little birds like the brown creeper. Woodpeckers, of course, can drill after the winter-stiff grubs which their still-unexplained X-ray senses detect in the sapwood of trees. And seed-eating species find plenty of weed and grass seed-heads sticking up through all but the deepest snow.

Among the winter migrants into the North from the Farther North some of the most interesting (and useful, too) are the owls. Great horned owls are fairly frequent, and once in a while a snowy owl turns up, even in the neighborhood of cities. These air cruisers of the dusk do us a real service, rarely appreciated by persons who "just don't like owls," in keeping the small-rodent population within bounds. The food of most owls is mainly mice, and they do their keenest hunting just when other winter hardships have the mouse population under greatest biological tension. Owls may look and sound misanthropic, but they are greater friends of man than many a more melodious bird family.

Winter-flying hawks, second cousins to owls, also deserve better of human hands than they usually receive. They, too, feed mainly on rodents, including rabbits, which might otherwise breed their numbers up to pest proportions. Hawks also migrate, but the summer population that leaves is replaced by a winter one that moves in, so that the flying patrol is maintained the year round.

Science News Letter, December 1, 1945

Sharks' livers, which furnish three-fourths of the American supply of vitamin A, vary greatly in vitamin potency even within a single species.

Beets, carrots, parsnip, cabbage and other hardy *crops* should be left in the garden as long as possible in the fall; they will stand repeated light frosts without injury.

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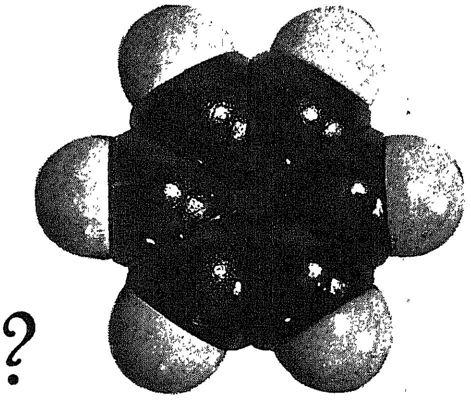

An illustration from an article in CHEMISTRY describing models that show the Invisible World of ATOMS

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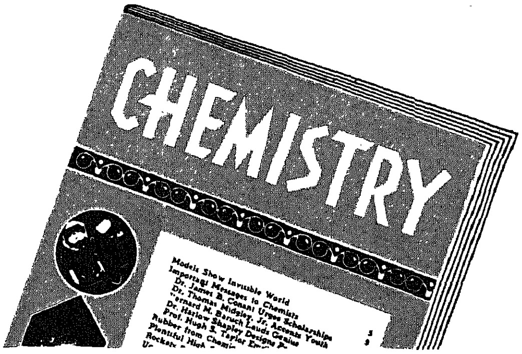

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AIR TRAFFIC CONTROL—Glen A. Gilbert—*Ziff-Davis,* 274 p., illus., $5. A textual treatment of existing systems of air traffic control, one of the newest activities in the field of aviation, and a guide to assist in meeting future problems.

BRAZIL: Orchid of the Tropics—Mulford and Racine Foster—*Cattell,* 314 p., illus., $3.50. A trip of exploration through Brazil in a search for air plants and jungle gardens.

HANDBOOK OF METEOROLOGY—edited by F. A. Berry, Jr., E. Bollay, and N. R. Beers—*McGraw-Hill,* 1068 p., illus., charts and tables, $7.50. A text and reference book to cover the entire subject with information for the beginner and the expert.

HANDBOOK OF NONFERROUS METALLURGY; Recovery of the metals—Donald M. Liddell, editor—*McGraw-Hill,* 721 p., illus., $7. Dependable facts on the metallurgy of each metal in detail for the practicing metallurgist.

LESSONS IN ARC WELDING—Lincoln Electric Company—*Lincoln Electric Company,* 176 p., illus., 50 cents. Second ed. 61 lessons in welding as taught at the company's welding school with questions and answers.

THE MILKY WAY—Bart J. Bok and Priscilla F. Bok—*Blakiston,* 224 p., $2.50. Second ed., illus. One of eight books by members of the Harvard College Observatory staff presenting in semi-popular form advances made in the exploration of the Milky Way with modern technique and equipment.

ON TO WESTWARD: War in the Central Pacific—Robert Sherrod—*Duell,* 333 p., maps, $3. A personal record of the campaign between Tarawa and Okinawa.

PRESCRIBING OCCUPATIONAL THERAPY—William Rush Dunton, Jr.—*C. C. Thomas,* 151 p., $2.50. Second ed. General principles and practical applications for patients of varying ages and needs.

THE RING-NECKED PHEASANT AND ITS MANAGEMENT IN NORTH AMERICA—William L. McAtee, editor—*American Wildlife Institute,* 320 p., illus., $3.50. Historical and practical information for pheasant farmers about a fascinating game bird by several well-known authorities.

ROCKS AND RIVERS OF AMERICA—Ellis W. Shuler—*Cattell,* 300 p., illus., $4. Everyday questions about the landscape by a widely traveled geologist in down-to-earth language.

SOME EARLY MIOCENE CARNIVORES—Elmer S. Riggs—*Field Museum,* 114 p., illus., $1. A detailed description of important specimens by a specialist in the field.

Science News Letter, December 1, 1945

Most of the 664 thoroughbred *stallions* taken from France by the Nazis during the war, being easily identifiable, have now been located in Germany and are being returned.

ELECTRONICS

Life-Boats Equipped With Radar Device

➤ A TINY RADAR device known as the "corner reflector" that weighs slightly over a pound enables life-boats, carried on Army Air Forces overseas missions, to be as easily detected as a flashlight in a blackout, the Air Technical Service Command announced.

The small size of the corner reflector makes it standard equipment not only in multi-place rafts carried by bombers, but in single-place rafts carried in fighter aircraft as well. Life-raft packs carried on the backs of aviators along with their parachutes hold the collapsible corner reflector packed in its small carton.

A cloth mesh, woven of monel metal fire, is the important feature of the reflector, which is attached to a mast extending from the raft.

This mesh reflects the radar waves transmitted by the searching aircraft. The radar scope within the plane picks up the reflected waves, thus revealing the exact position of the downed victims.

The famous "Gibson Girl" life-raft radio set used in multi-place boats is not replaced, but the single craft is too small to accommodate this SOS equipment. The smaller rafts rely upon the corner reflector as their only radio signal device.

The radar reflector was produced in large quantities for operational use during the war. It was used extensively in the Pacific because on the wide stretches of water the reflector could be easily detected.

(*Turn to next page*)

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An even greater asset of the reflector was that it offered security from enemy listening stations since it did not transmit a signal. It has no moving parts, is sturdy, and requires few repairs.

Science News Letter, December 1, 1945

AERONAUTICS

First Twin-Fuselage Military Aircraft

➤ A NEW TYPE airplane, the world's first twin-fuselage military aircraft, is under contract, it is revealed by the Army Air Technical Service Command. The unique plane, a marked departure from the conventional single-fuselage craft, will have two fuselages joined by the wing and the horizontal stabilizer. It supplants the P-51 Mustang, and will be known as the P-82 Twin Mustang.

The Twin Mustang, it is expected, will have a speed of over 475 miles an hour, will operate efficiently up to 45,000 feet, and will climb at a rate over 5,000 feet per minute. With a 2,200 horsepower engine in each fuselage, the plane utilizes two opposite-rotating, full feathering four-bladed propellers. It will have two pilots, one in each fuselage, the one on the left being the "main" pilot who will ordinarily operate the controls.

Science News Letter, December 1, 1945

PHYSICS

Prof. D. W. Kerst Gets Comstock Prize

➤ FOR HIS development of the betatron, world's most powerful X-ray producing machine, Prof. Donald W. Kerst of the University of Illinois has been awarded the Cyrus B. Comstock prize of the National Academy of Sciences. The award was presented by President F. B. Jewett of the National Academy at a joint meeting of the Academy and the American Philosophical Society.

Prof. Kerst was selected for the honor in 1943, but wartime secrecy on all work involving nuclear physics prevented the announcement until now. His betatron is valuable to science both in the enormous energies it produces and in the precise control of them. During the war, Prof. Kerst was on the staff of the secret atomic bomb laboratory at Los Alamos, N. M.

Science News Letter, December 1, 1945

India is reported to have vast ***chromite*** reserves.

The extinct *dodo,* long a symbol of stupidity, was a member of the pigeon family.

About 40% of the fresh *vegetables* used in the United States, and half the canned vegetables, are raised in home gardens.

Hexachlorocyclohexane, a newly announced British insecticide, is also called 666 because its molecule contains six atoms each of carbon, hydrogen and chlorine; it is new as an insecticide but is an old compound first made by Faraday in 1825.

FORECAST THE WEATHER

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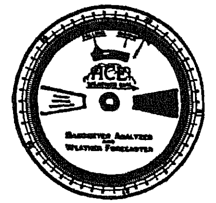

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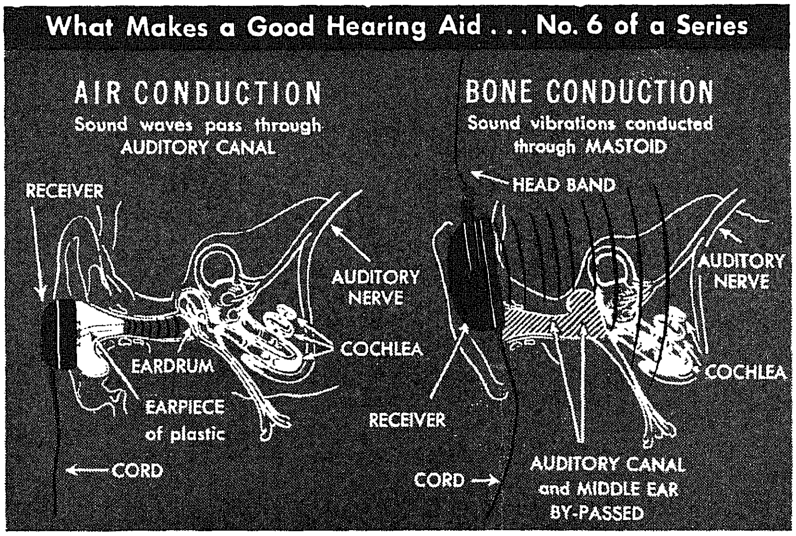

RECEIVERS

● The microphone picks up sound waves and converts them into corresponding electrical impulses for amplification in the electronic hearing aid. It is the function of the receiver to convert this stepped-up energy into a form which can be conducted to the hearing mechanism. Depending upon the type of hearing impairment, this may be accomplished in two ways:

1. Air conduction ... *through the auditory canal ... to the inner ear.* A receiver for this application converts the amplified impulses into sound waves in the auditory canal via the usual hearing mechanism. It is a miniature version of a fine telephone receiver—with similar vibrating diaphragm, magnet and coil encased in a tiny and inconspicuous plastic housing. An earpiece, which fits into the contour of the ear, holds the air conduction receiver in place. (An individually molded earpiece offers the user advantages of comfort and reduction in possible leakage of sound.)

2. Bone conduction ... *through the mastoid ... direct to cochlea and auditory nerve.* The receiver intended for this purpose converts the amplified impulses into mechanical vibrations which are transferred to the bone structure in the mastoid area. These vibrations are transmitted through the bones of the skull, by-passing an inoperative middle ear. Instead of an internal diaphragm, the whole case of a bone conduction receiver vibrates. A headband holds a bone conduction receiver firmly against the particular spot on the mastoid that gives the best hearing results to the individual user.

Subsequent advertisements in this series will discuss criteria for the selection of receivers that will give the best performance for varying degrees and types of hearing loss.

A selection of one of three types of air conduction receivers and one bone conduction receiver is available with the new Western Electric Model 63 Hearing Aid. All Western Electric receivers are manufactured to design and material standards of Bell Telephone Laboratories.

THIS SERIES, BASED UPON RESEARCH CONDUCTED BY BELL TELEPHONE LABORATORIES, IS PUBLISHED IN THE INTEREST OF THE HARD OF HEARING AND THEIR PHYSICIANS

Western Electric Hearing Aids

MADE TO BELL TELEPHONE STANDARDS

• New Machines and Gadgets •

⚙ *RAINCOATS of the future may be carried in a woman's pocketbook. They weigh six or eight ounces and fold into packages little larger than cigarette cases. Fabricated of vinyl plastic, they retain full flexibility in cold weather.*

Science News Letter, December 1, 1945

⚙ *OPTICAL INSTRUMENT, known as a multi-scale monocular, permits the user to measure and compare small objects with the aid of a highly corrected six-power optical system and six selective scales, all of which are incorporated in the instrument.*

Science News Letter, December 1, 1945

⚙ *ALUMINUM containers with a capacity of half a railroad box car are designed to be loaded in factories and transported by truck-trailer to the railroad track. They are shifted on or off a flat car with the aid of built-in hydraulic jacks and ball-bearing rollers.*

Science News Letter, December 1, 1945

⚙ *PERMANENT MAGNETS are designed to extract screws, nuts, bolts and other magnetic materials from inaccessible locations. The magnets are attached to flexible or rigid handles by standard screw connections.*

Science News Letter, December 1, 1945

⚙ *POCKET RADIO, with reception comparable to that of the usual five-tube receiver, weighs 10 ounces and is 3 inches wide, 6¼ inches high and ¾ inches thick. It has five sub-miniature tubes, each with a cross-section about the same as that of an oval cigarette. The picture shows the radio being inserted in a special pocket in a knapsack.*

Science News Letter, December 1, 1945

⚙ *RECORDING - REPRODUCING machine for office use in dictating letters or recording conferences, records the voice on a belt 3½ inches wide. The belt, of an unbreakable, flexible plastic, can be flattened to fit into a small mailing envelope. Double recording heads permit continuous recording.*

Science News Letter, December 1, 1945

⚙ *GARDEN HOSE coupling consists of two metal ends, one of which fits into the other and is locked by a sliding knurled ring. When the ring is pulled forward, it compresses a coil spring, forcing holding lugs down behind a locking ring on the inserted part.*

Science News Letter, December 1, 1945

⚙ *DRY-ICE liquefier transforms solid carbon dioxide into liquid form for bottlers of carbonated beverages and other uses of carbon dioxide. It is an all-welded steel tank large enough to hold half a ton of dry ice. In use, water runs down the outside from a perforated ring near the top.*

Science News Letter, December 1, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 287.*

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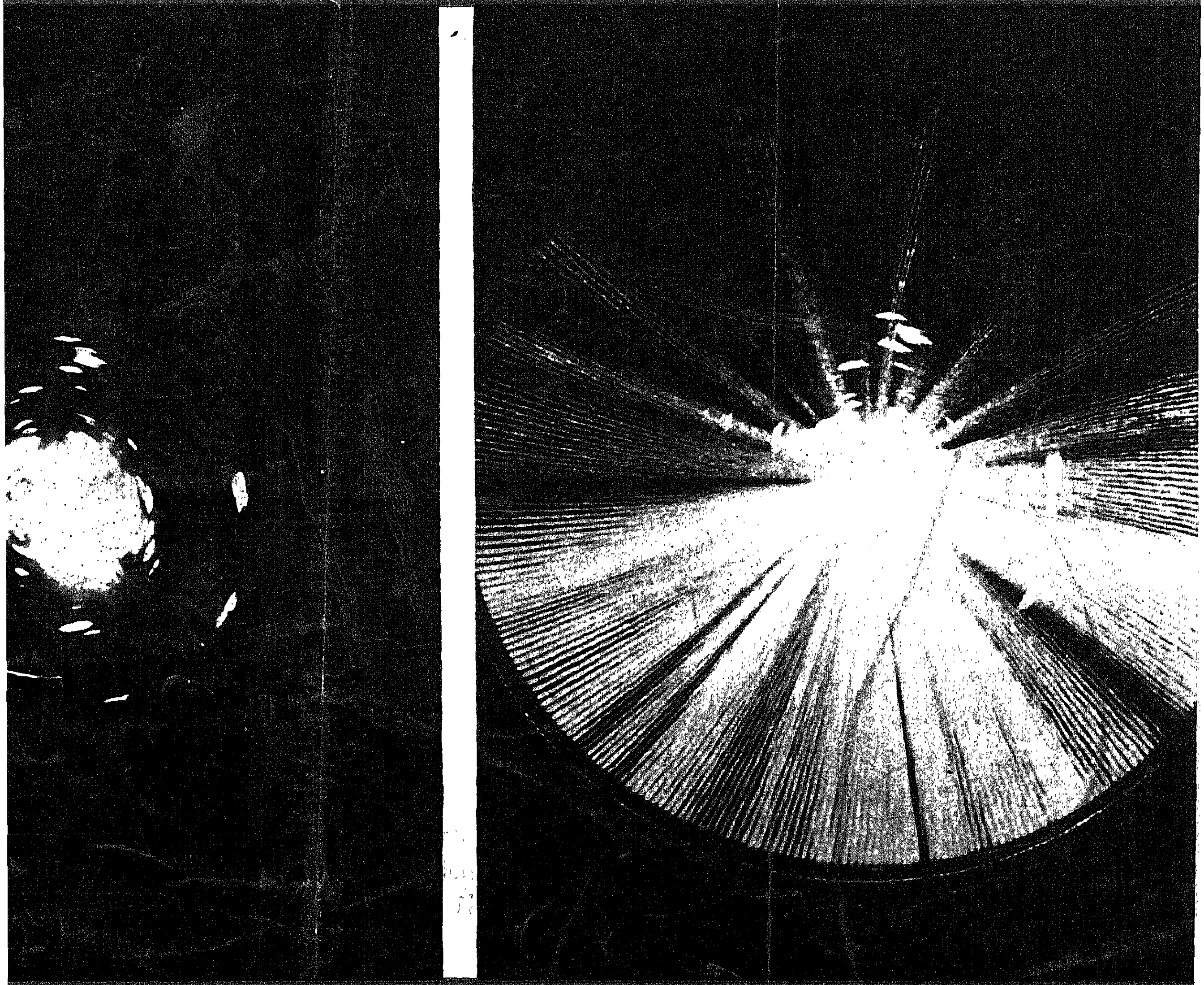
IENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • DECEMBER 8, 1945



Interference

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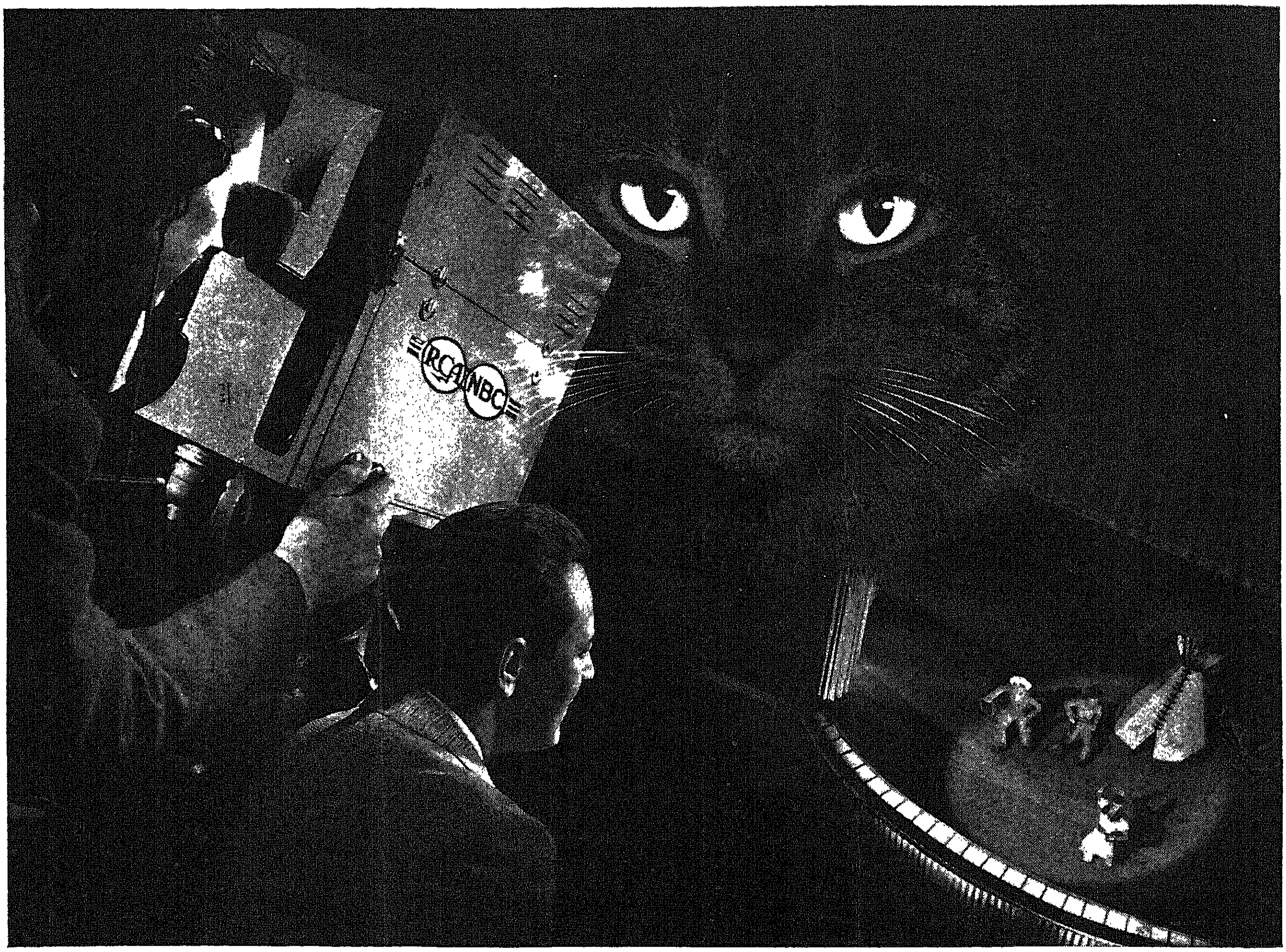
A SCIENCE SERVICE PUBLICATION



RCA's new television camera has a super-sensitive "eye" that sees even in the dimmest light—indoors or outdoors.

A television camera "with the eyes of a cat"

As a result of RCA research, television broadcasts will no longer be confined to brilliantly illuminated special studios—nor will outdoor events fade as the afternoon sun goes down.

For RCA Laboratories has perfected a new television camera tube, known as Image Orthicon. This tube, a hundred times more sensitive than other electronic "eyes," can pick up scenes lit by candlelight, or by the light of a single match!

This super-sensitive camera opens new fields for television. Operas, plays, ballets will be televised from their original performances in the darkened theater. Outdoor events will remain sharp and clear on your television set—until the very end! Television now can go places it could never go before.

From such research come the latest advances in radio, television, recording—all branches of electronics. RCA Laboratories is your assurance that when you buy any RCA product you become the owner of one of the finest instruments of its kind that science has achieved.

Radio Corporation of America, RCA Building, Radio City, New York 20. *Listen to The RCA Show, Sundays, 4:30 P. M., Eastern Time, over NBC.*

RCA Victor television receivers with clear, bright screens will reproduce every detail picked up by the RCA super-sensitive television camera. Lots of treats are in store for you. Even today, hundreds of people around New York enjoy regular weekly boxing bouts and other events over NBC's television station WNBT.

RCA ***RADIO CORPORATION of AMERICA***

ELECTRONICS

Counter-Radar Devices

Aluminum foil scattered in the air and electronic jamming both successful anti-radar devices. Our pilots also knew when they were being hunted.

See Front Cover

➤ FIRST CAME radar—then radar countermeasures. Enemy radar had to be killed during the war as well as enemy industrial production and gunfire. How the effectiveness of German and Japanese radar was destroyed by the Allies was revealed to a group of science writers at the Harvard Radio Research Laboratory and demonstrated at the Bedford Army airfield. A little information about the use of aluminum foil had already been made public, but the full story of the various radar countermeasures developed had been untold until then.

Radar countermeasures include anti-radar devices, which are jamming systems that interfere with radar echo. Most of the scientific work in developing radar countermeasures was done at the Harvard Radio Laboratory, a wartime institution under Division 15 of the National Defense Research Committee, and was financed by government funds through the Office of Scientific Research and Development.

Radar installations were the "eyes" of the enemy as well as of the Allies. Approaching planes, surface vessels, submarines and other machines of war were detected and located by radar. Radar was also used to locate production plants, shipping piers, bridges and other structures playing active parts in warfare. Radar not only detected approaching warcraft, but automatically aimed anti-aircraft and other guns at them. Successful anti-radar devices were a number one war essential.

When the Allied radar jamming system was first sprung on the Germans in 1943, it threw their defenses into utter confusion and decreased by 75% the effectiveness of their anti-aircraft guns. In the last days of the wars, both in Europe and the Pacific, the Allied anti-radar devices had made such a boomerang of German and Japanese radar that they often gave up using radar lest it betray them. The photograph on the cover of this SCIENCE NEWS LETTER shows the appearance of typical "PPI" radar scope unjammed, left, and on the right the appearance when partly jammed. When completely jammed, all planes are entirely obliterated. The isolated light spots in the unjammed picture represent targets or objects at different distances and directions.

Anti-radar devices were of two general types: aluminum foil called "window" or "shaff," and electronic detectors and jammers. The use of the foil became known to many during the war, but the extent of its use was revealed for the first time at the demonstration. Approximately 20,000,000 pounds of aluminum foil was dropped in Europe alone. Cigarettes and candy bars in the United States were without aluminum wrappings because the entire production of foil was needed for window.

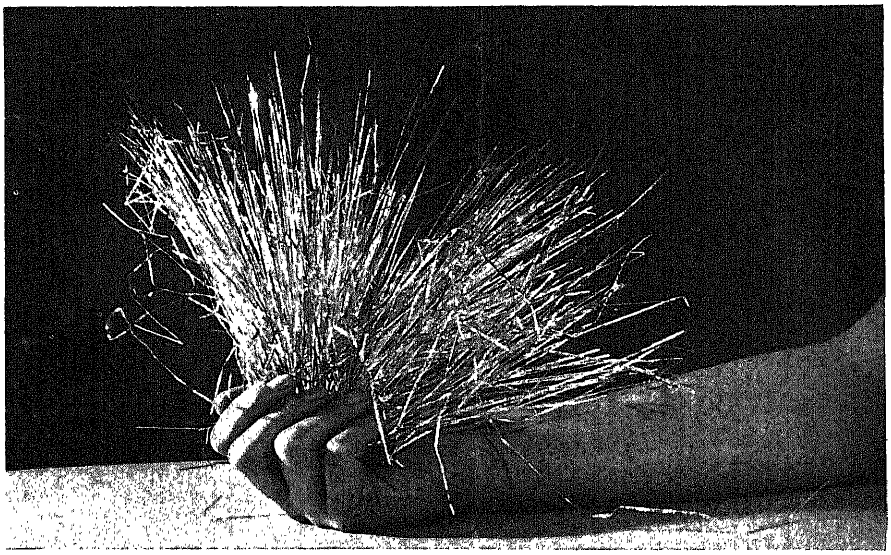
Aluminum foil is an excellent radio reflector and it returns a relatively strong radar echo in proportion to its size. What made it particularly valuable as window, however, was a discovery made by the scientists that its effectiveness is greatly increased when the strips were cut to one-half the radar's wavelength. These "tuned" strips send back a strong echo.

The thin strips of aluminum used are only a tiny fraction of an inch wide and a few inches long. A bundle of 6,000 strips weighs six ounces. A single bundle dropped from a plane, scattering in the air, looks to a radar like three heavy bombers. The science writers watched the scope of a radar in a darkened room while this electronic "smoke screen," or window trail, was distributed by three planes. Following planes in the trail failed to record on the scope, even a half-hour later.

Electronic jammers operate on the simple principle of radio interference, similar to the interference with which most home radio users are familiar when they receive two broadcasts from two stations on the same wavelength. The jammers attacked enemy radar receivers with radio waves from planes modulated by random "noise," which drowned out any audible radio echoes from the radar's target and obliterated all signs of the target from the radar's screen, or scope.

A radar can be jammed, Radio Laboratory scientists explained, only by waves of the same wavelength or frequency. Therefore a basic instrument in radar countermeasures is an electronic detector called the "search receiver" which can be tuned to intercept a radar signal and determine its frequency.

When equipped with directional antenna, this receiver can locate an enemy radar set. These direction-finding receivers have a much greater range than radar itself, and for this reason often proved



STOPPED RADAR—A handful of the aluminum foil which was scattered in the air to blot out radar echo. Photograph by Fremont Davis, Science Service staff photographer.

better than radar for locating the enemy. A radar-hunting operator could locate an enemy radar station long before the radar could locate him.

During the latter part of the war, United States planes and surface vessels often knew by use of these direction-finding receivers when they were being hunted by enemy radar, and they often detected and pounced on the hunters before the enemy radar discovered them. German submarines, they said, eventually stopped using radar to avoid detection by these receivers.

Science News Letter, December 8, 1945

ELECTRONICS

Anti-Radar Station

Powerful land-based jammer in England blinded German planes following English bombers homeward. Key of device is American special vacuum tube.

➤ IN ADDITION to aluminum foil and air-borne electronic devices to blind or jam enemy radar searching for Allied air and surface warcraft, there was also the ingenious land-base radar countermeasure device known as "Tuba." Information concerning it has been released by the Joint Board on Scientific Information Policy for the Office of Scientific Research and Development and the War and Navy departments.

Tuba was a tremendously powerful jamming transmitter developed for use against German night fighters. In 1942 the Germans were taking a heavy toll of British night bombers, using an air-borne interception radar known as "Lichtenstein" for close-range location of their targets.

Against them, the report states, the British found it impractical to use jammers carried in their bombers, because the jammer itself provided a signal which German fighters could use to locate the bomber. A radio signal, including a jamming one, betrays the direction from which it comes, and even though a jammer might blot out a German scope, making it impossible to find the range, the German could find the bomber simply by following the signal.

To meet this problem the idea was conceived of developing a very highpowered jammer in England to blind the German fighters' radar as they flew toward it in pursuit of the homeward-bound bombers. A jammer of this sort obviously would require power a thousand times greater than any previously attained in the frequency range of operations involved, which in itself was 10 times higher than that used for frequency modulation and television.

The problem was solved by the development of a very remarkable vacuum tube developed in the United States, known as the "resnatron." It was necessary to build a resnatron that would be tunable over a wide frequency range because the Germans could change the frequency of their radars by slight modifications. Also it was necessary to find a way to modulate the resnatron's output with the random "noise" necessary for jamming. Both objectives were accomplished, and by January, 1944, a workable instrument had passed its tests.

By June, 1944, the complete jamming system was in operation against the enemy. Its power was comparable with the most powerful United States broadcasting station (50,000 watts), yet the frequency of operation was 500 times as high.

Science News Letter, December 8, 1945

AERONAUTICS

Transoceanic Flying Failures Greatly Reduced

➤ TRANSOCEANIC flying has now advanced to the point where commercial operations may be conducted with flight failures approaching zero, declared Frank R. Canney of Boeing Aircraft Company at the national air transport engineering meeting of the Society of Automotive Engineers in Chicago. He estimated the probable frequency of emergency landings, or "ditchings," on the New York-London flight currently as about one in 16,576 flights.

Mr. Canney cited wartime flying records to prove his point. He reported that total AAF B-29 operations during the war, including combat flying, resulted in only one "ditching" for each 750,000 miles flown.

Increased cruising speeds, improved engine performance, and the operating policy of adopting alternate flight plans whenever trouble begins to develop, make the chances of emergency landings low, he said. Transoceanic flying safety is enhanced, he continued, by use of weatherproofed aircraft equipped with pressured cabins, four supercharged engines, and radio communication.

Flying altitudes of 15,000 to 35,000 feet, he added, enable planes to take advantage of the most favorable winds. Flying speeds of 200 to 400 miles an hour make crossings so brief as to minimize chances of mechanical failures. Engineering requirements for overwater flying differ little, Mr. Canney stated, from those of overland routes.

Science News Letter, December 8, 1945

SCIENCE NEWS LETTER

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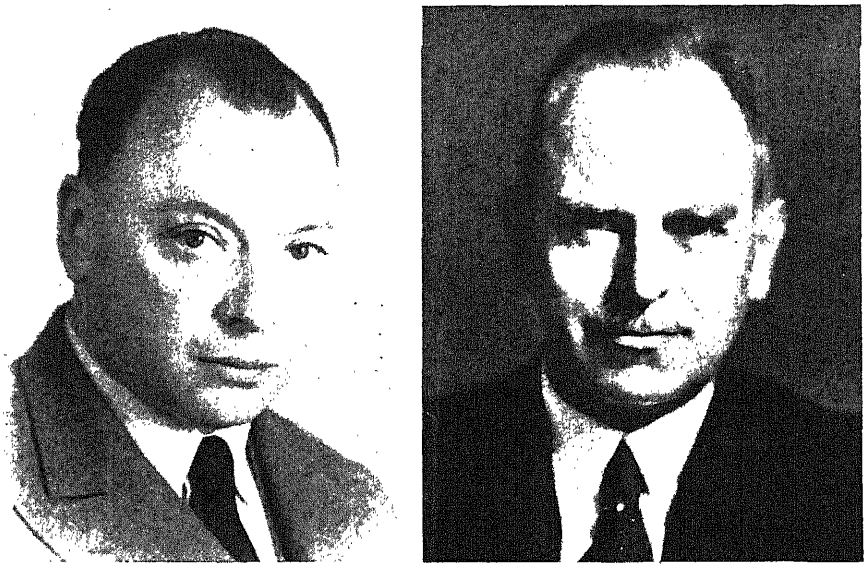


NOBEL WINNERS—Prof. Wolfgang Pauli, left, was awarded the 1945 physics award for theoretical studies on atomic structure and Prof. Otto Hahn, right, the 1944 chemistry award for his fission of the uranium atom. (See SNL, Dec. 1)

CHEMISTRY

Synthetic Fuel Methods

American fuel chemists have uncovered a German manufacturing process; valuable information obtained to assist our industry.

➤ AMERICAN fuel chemists, members of a government technical mission to Germany, uncovered German synthetic fuel manufacturing methods and brought back to this country information of value on how the Nazis kept fighting equipment in operation with little natural oil available. The methods are applicable in this country.

A preliminary report on the findings of the American chemists was given by Dr. W. C. Schroeder of the U. S. Bureau of Mines, before the meeting of the American Society of Mechanical Engineers in New York. Full reports will be available later when other members of the mission have completed summaries of their findings. They will contain, Dr. Schroeder stated, "the best ideas generated through the years of research that the Germans spent on the synthetic oil industry."

The group of scientists went to Europe in March, 1945, about three months before V-E day, and remained to study synthetic oil plants in Germany as rapidly as they were seized by the Allies. Most of them had been knocked out by the Allied air forces but the debris was carefully studied.

"The examination was a tiring job of climbing over bricks, rubble, tanks and destroyed stairways," Dr. Schroeder declares.

Additional information was obtained from scientists of France, Belgium and the Netherlands who were in a position to know something of the German methods.

Allied bombing raids put the Nazi fuel oil and petrol plants practically out of business, Dr. Schroeder explained, forcing others underground.

"Toward the end of the war, the demand for oil became so great that the Germans were frantic to increase production by any means," he said, "and 10 Meiler plants were ordered constructed. They were to be finished within a few weeks. The Allied advance was so rapid, however, that only four operated and these for less than a month. A fifth was ready but was never operated."

Some of the plants in Germany were of "tremendous size," and blending formulas, the amount of tetraethyl lead to be used in aviation gasoline or additives for lubricating oil were all specified in Berlin, he stated. In this way, "the make-up of the finished product was known only to a limited number high in the Nazi inner circle," he stressed.

"German synthetic production reached a peak of somewhat over 350,000 metric tons per month in 1944," Dr. Schroeder stated. "About the middle of that year, bombings became severe and production dropped rapidly. During bad weather, which forced reductions in bombing operations, production again picked up until the last month of 1944. Bombing again increased in intensity, and toward the end of the war synthetic production became practically insignificant."

Science News Letter, December 8, 1945

PLANT PATHOLOGY

Graft Method Fails; Tomatoes Are Poisonous

➤ ONE BEST-LAID plan of scientists to outwit a crop-ruining plant disease has gone agley because of uncooperative behavior on the part of one of the plants involved.

Tomato roots are often attacked by a parasitic worm known as a nematode, which produces a deformity called root knot and causes heavy losses in yield. A disreputable botanical second cousin of the tomato, the foul-smelling, poisonous jimsonweed, is immune to nematode attacks.

It occurred to a cooperating group of scientists, of the U. S. Department of Agriculture and the Alabama Agricultural Experiment Station, to try grafting tomato plants on these immune jimsonweed roots. The grafts "took" all right, and the plants bore tomatoes—but the tomatoes contained poison formed in the weed roots that fed them. Tomato-eating rabbits, caught in the act in the experimental plots, had become so intoxicated that they bumped into plant stalks and even against the legs of their pursuers.

The scientists haven't quite given up. It was noticed that some of the tomatoes from the grafted plants contained less of the jimsonweed poison than others. It may be that a tomato strain can be found that will not accept the poison from the jimsonweed roots, or that a less-poisonous variety of jimsonweed will turn up. But unless and until that happens, nematode root knot will have to be fought along other lines.

Science News Letter, December 8, 1945

MEDICINE

Medical Reforms

Correction of X-ray film situation and hormone treatment advised. Fight urged for animal experimentation, study of marihuana problem recommended.

➤ CORRECTION of the X-ray film situation which causes needless expense and trouble to many patients is among a number of reforms advised by Dr. Herman L. Kretschmer, of Chicago, president of the American Medical Association, at the opening session of the association's house of delegates.

Dr. Kretschmer believes that when a patient has recently had a satisfactory set of X-ray pictures made at one hospital or by one roentgenologist, he should be able to get the films when he consults another physician who wants X-ray pictures to help in diagnosis. Too often at present, hospitals and roentgenologists or other physicians refuse to release the films and the patient is put to the expense and trouble of having another set made.

The present "fad" of considering every obscure complaint as due to endocrine gland disturbance and treating it with hormones is another situation that needs correction, Dr. Kretschmer advised the medical association's policy-making body. He praised highly the various scientists responsible for advancing knowledge of the glands and their disorders, but warned against turning the use of hormones into "another vitamin-like fiasco."

The hormone-conscious public, he stated, should be protected by physicians from the danger of misuse of hormones and by advertisers, health columnists and scientific writers for the lay press from wrong information about hormones.

The marihuana problem, "acutely before the nation today," should be investigated by the American Medical Association, Dr. Kretschmer advised, so that authoritative facts about this drug become known.

Medicine should take the offensive and get laws passed enabling medical scientists to perform experiments on animals rather than forever remaining on the defensive against the attacks of anti-vivisectionists, Dr. Kretschmer urged. Both man and animals benefit from animal experimentation, he declared. The public needs to know the facts of the situation and county medical societies should take the lead on this, he added.

County medical societies themselves were told by the A. M. A. president that they should enlarge or expand their scientific meetings and hold some for the lay public at which timely educational topics could be discussed.

Positive action on the deferment of medical and premedical students from service in the armed forces should be taken by the association which, Dr. Kretschmer declared, should demand that a situation of "confusion and chaos" should not be permitted to arise again.

He reiterated the association's stand against "regimentation of medicine" by which, though not specifically mentioning it, he apparently referred to proposed legislation for compulsory health insurance.

Science News Letter, December 8, 1945

FOR THE RECORDS—Here is one of the pictures in a play by play story of an amputation operation photographed by the new clinical camera developed by the Pictorial Engineering and Research Laboratory of the Signal Corps Photographic Center as a joint project of the Signal Corps Army Pictorial Service and the Surgeon General's office. (See SNL, Nov. 24)

AERONAUTICS-METEOROLOGY

Fly Regardless of Weather

Independence of atmospheric conditions predicted for commercial aircraft. With radar and de-icing devices, flights may be completed 99% of the time.

➤ "PRACTICALLY independent of the weather" is the forecast for commercial airplanes of the future, according to Dr. C. C. Furnas, director of research for the airplane division of Curtiss-Wright Corporation of Buffalo. He foresees completion of flights 99% of the time, as compared with the present average of 91%. The prediction was made at a recent meeting of the American Society of Mechanical Engineers in New York.

"Adaptation of the various devices of radar to the development of very reliable blind landing systems, coupled with heat de-icing for wings and propellers, should in the near future bring us to the point where commercial aircraft flights can be completed 99% of the time as contrasted to the present 91%," Dr. Furnas said. "This will make a tremendous difference in the confidence which the traveling public will have in aviation, and hence will greatly increase the number of potential passengers."

"Phenomenal changes" in commercial aircraft should not be expected in the near future, he indicated, but there will be a steady improvement to bring the newer things in aviation to the public.

"The focus of attention of most research work in commercial aircraft," Dr. Furnas stated, "is on speed, safety, comfort and reliability. Aero-dynamic constructional research will make significant contributions, but it is anticipated that the developments which will be most evident to the public will be in safety, comfort and reliability."

The average speed of airliners will be from 225 to 300 miles an hour, he expects. This is in comparison to 180 miles an hour, a speed now quite common. The bulk of the air travel in the United States about a year from now will be carried in planes of from 40- to 60-passenger capacity, with a few of 100-passenger capacity. It is not expected, he said, that any of the super-sized airplanes will be in use for some time.

Science News Letter, December 8, 1945

ENGINEERING

Disabled Are No Problem

Physically impaired workers present no employment problem to industry if definite program of fitting man to job is followed.

➤ PHYSICALLY impaired workers, whether returned veterans or others, present no employment problem to industry if management follows a definite program of fitting the man to the job, declared John V. Grimaldi, research engineer, National Conservation Bureau, New York, at the meeting of the American Society of Mechanical Engineers in New York. Fitting the job to the man is frowned on in the modern selective placement program and "only should be considered as a last resort," he said.

Mr. Grimaldi is a research engineer in the Association of Casualty and Surety Executives in its national conservation bureau. The successful placement of the physically impaired depends primarily on good personnel or management planning, he emphasized.

"Before one can recognize fully the employment equality between the impaired and the normal worker, he must cleanse his thinking of any misconception concerning the impaired," he stated. "He must be able to look at a noticeably impaired worker objectively and remember that a twisted, deformed or lame body may be equipped, for example, with a fine mind or be capable of extreme dactyl dexterity. An impaired person may have any grouping of a number of outstanding abilities.

"It is generally our unfamiliarity with severe impairments that corrupts our thinking," he explained, "so that we evaluate the impaired solely in terms of the deficiencies we see. It would be more appropriate if we regarded such workers not as physically disabled, but as physically exceptional."

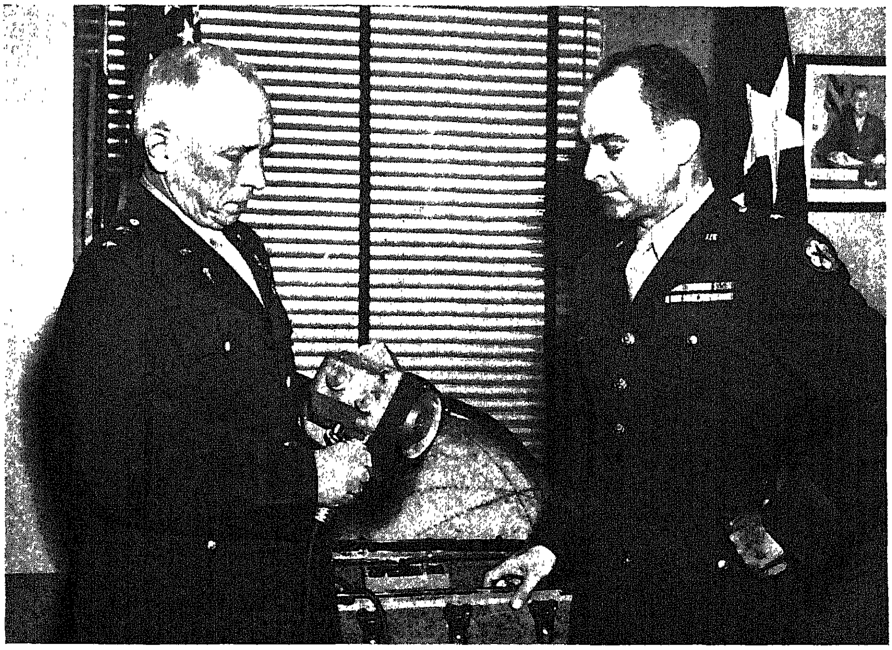
The program for the successful placing of impaired workers, Mr. Grimaldi outlined, should contain a definite company policy on rehabilitation, analysis of jobs with special reference to disabled workers, medical determination of an applicant's physical capabilities, matching men to the job, job training, and periodic review of such placements.

$12,000,000,000 Business

➤ OPERATIONS of the Army Ordnance Field Service, storing and supplying to the Army the materiel of war, compares in scope with both the wholesale and retail functions of a vertically organized concern manufacturing $12,000,000,000 worth of goods a year and distributing in both domestic and foreign markets, declared Brig. Gen. E. E. MacMorland at the same meeting.

Vital to the system, he said, were 53 storage depots covering 285,000 acres and employing 100,000 workers. Despite these storage facilities, during the last stages of the war some 35% of the total tonnage of ordnance supplies were shipped directly from manufacturing plants to ports, he said.

Science News Letter, December 8, 1945



SPEEDY CAMERA—Maj. Gen. Norman T. Kirk, Surgeon General, U. S. Army, and Brig. Gen. Edward L. Munson, Jr., Signal Corps, inspect the new speedy camera for medical photographs. Every phase of the picture-taking except focusing and clicking the shutter is automatic. (See SNL, Nov. 24)

ENGINEERING

Electric Finger Guides Machine Tools in Cutting

➤ WHAT MIGHT be turned an electric finger, designed to guide machine tools in the cutting of dies and other metal articles at once intricate in shape and precise in dimensions, is the invention on which patent 2,389,594 has been issued to a trio of inventors, S. H. Caldwell of Belmont, Mass., J. J. Jaeger of Cambridge, Mass., and Richard Taylor of Great Neck, N. Y.

A pointed metal rod or stylus slides over the contours of pattern or template. Metal masses connected with its shank move through hollow electromagnets. Every lateral or longitudinal deviation of the finger thus results in a change in one or more magnetic fields, and these changes, suitably relayed, control the action of electric motors that in turn guide the cutting tools.

Patent rights have been assigned to the Niles-Bement-Pond Company of Hartford, Conn.

Science News Letter, December 8, 1945

ASTRONOMY

Bright Comet Found In Constellation Corona

➤ A BRIGHT comet was found the evening of Nov. 22 in the constellation of Corona, the northern crown, by an amateur astronomer, Clarence L. Friend, of Escondido, Calif., according to a telegraphic report to Science Service.

The comet was comparatively bright, being of the seventh magnitude, just too faint to be seen with the naked eye.

Because of its brightness, this comet is probably not a periodic comet, although a few faint ones are due about this time.

The seventh magnitude comet was independently located by another amateur astronomer, Leslie C. Peltier of Delphos, Ohio. Both amateurs are credited with discovering several comets. Plates taken the evening of Nov. 24 at the Harvard Observatory confirm the existence of this bright heavenly traveler.

Comet Friend, when located on Nov. 22, had a right ascension of 16 hours, 20 minutes, and a declination of 30 degrees north. Located in the constellation of Corona, the northern crown, it now has moved to the constellation of Hercules.

The comet was moving slowly toward the sun, and could be seen only shortly before sunrise and just after sunset.

Science News Letter, December 8, 1945

SEISMOLOGY

Severe Earthquake Had Epicenter in Oman Gulf

➤ THE VERY SEVERE earthquake in southwestern Asia, of which only fragmentary reports have been filtering into the news, had its epicenter under the Gulf of Oman, between the southeastern corner of Iran and the opposite corner of the Arabian peninsula. This is the body of water where Sindbad the Sailor had many of his troubles. An earthquake between its confining shores could easily enough have launched a tidal wave that would be felt at Bombay, and Karachi, India, on the opposite side of the Arabian Sea; nearer shores may have been even more heavily battered.

Approximate location of the epicenter was determined by seismologists of the U. S. Coast and Geodetic Survey only after reports had been gathered by Science Service from a wide network of observatories, all the way from Massachusetts to Australia and from Alaska to New Zealand.

The provisional "fix" places the epicenter somewhere in the neighborhood of latitude 23 degrees north, longitude 60 degrees east. Time of origin was 4:56.9 p.m., EST, on Nov. 27, or 1:56.9 a.m., local time, on Nov. 28.

Overseas seismological stations reporting were those of Riverview College, Sydney, N.S.W., Australia; the Dominion Observatory, Wellington, New Zealand, and the U. S. Coast and Geodetic Survey observatory on the campus of the University of Hawaii at Honolulu. North American stations were those of the California Institute of Technology at Pasadena; the Jesuit Seismological Association at Georgetown University, Weston College in Massachusetts, and Spring Hill College near Mobile, Ala.; and the U. S. Coast and Geodetic Survey stations at Sitka and College, Alaska, and Tucson, Ariz.

Science News Letter, December 8, 1945

TECHNOLOGY

Shells of Hen's Eggs Are Like Those of Dinosaur

➤ SHELLS of eggs laid by barnyard hens today have the same crystalline structure as those laid by giant ostriches 100,000 years ago and those laid by dinosaurs approximately 100,000,000 years before our time.

That evolution throughout the centuries has had little effect on eggshells is demonstrated by X-ray diffraction patterns made by Prof. Bertram E. Warren of the Massachusetts Institute of Technology. Diffraction patterns tell more about crystals than chemical analyses because the same chemical compound may have several different crystalline forms.

The position and relative intensities of the diffraction lines, characteristic of the particular crystal structure, are used to identify crystals, just as fingerprints identify individuals, reports *Technology Review*. The diffraction pattern is made by sending a beam of X-rays through a small lump of pulverized shell. Each plane of the crystal separates the rays into a cone of light. These cones, striking the photographic film, produce the pattern, which is symmetrical about its center.

The giant ostrich and dinosaur eggshells have the same calcite structure as Iceland spar and chalk whiting. The same calcite form of crystal also was found in oystershells and lobster claws.

Science News Letter, December 8, 1945

IN SCIENC

CHEMISTRY-ZOOLOGY

DDT Found Poisonous To Minute Crustacean

➤ USE OF DDT to kill mosquito larvae in ponds and streams may result indirectly in reducing the fish catch, it is indicated by experiments of Prof. Bertil G. Anderson of the Franz Theodore Stone Laboratory of Ohio State University and of West Virginia University.

Prof. Anderson's experiments were on Daphnia, often called water-flea, an almost microscopic crustacean, distantly related to lobsters and crabs. Despite its minute size, Daphnia is important to fresh-water fisheries because it swarms in immense numbers, is eaten by small fish, which in turn are eaten by larger game fish such as bass and pickerel.

"It was found," Prof. Anderson reports, "in all but one instance, that 50% of the Daphnia were immobilized by concentrations of over one part per billion in 32 hours or less. Concentrations from one to one hundred parts per billion immobilized the animals in periods between 16 and 32 hours. Animals in concentrations of less than one part per billion survived as long as the controls in Lake Erie water alone. Some experiments were run as long as 130 hours.

"These results may be of significance in relation to using DDT for mosquito control, since in many localities it is essential that the zooplankton be protected."

Science News Letter, December 8, 1945

PHYSICS

Hundred Million Volt "Atom Smasher" Proposed

➤ A NEW kind of "atom-smasher" in the form of an electron accelerator which could be built more cheaply and efficiently than the betatron to produce electron streams of more than 100,000,000 volts was described to the American Physical Society in St. Louis, by Dr. J. R. Woodyard of Purdue University.

The proposed apparatus is a cavity resonator consisting of a long cylinder oscillating in a high order longitudinal electric mode. Its resonator would be driven in short bursts instead of continuously to reduce power requirements.

Science News Letter, December 8, 1945

E FIELDS

HORTICULTURE

"Peace" Rose Chosen as All-America Selection

➤ "PEACE," a gorgeous new rose variety, has been named as the All-America rose selection for 1946 by a committee representing a group of seed and flower trade associations. Its flowers are described as starting with big yellow buds that open into unusually large blossoms with pink edges on their petals and a pink flush suffusing the general yellow hue. Later in summer the yellow turns to a creamy or alabaster white.

"Peace" is a plant of robust growth, as anything bearing that name needs to be in these uncertain days. The stems are long and stout, the leaves large, dark-green, strong-textured and resistant to fungus diseases.

The new rose was originated in France by Francis Meilland. A few plants were started in this country, and official trials were carried on during the course of the war. The stock has now been increased to a point where general distribution has become possible.

Other All-America selections for 1946 include several new petunia varieties and a new snap bean named Longreen.

Science News Letter, December 8, 1945

GENERAL SCIENCE

Selective Service Policy Would Defer Scientists

➤ SCIENTISTS and students of science and engineering are now able to secure draft deferment in order to resume or continue their work, according to information obtained from Selective Service by Benjamin Wermiel, official of the National Roster of Scientific and Specialized Personnel.

A memorandum has gone out from Selective Service Headquarters to local boards telling them that individuals should now be considered for deferment for four different classes of reasons.

1. Graduate students may, under the new policy, continue their training for graduate degrees in science or engineering.
2. Individuals may be deferred so that they may teach science or engineering. This will help in handling the problem of the training of returning veterans.
3. Individuals may be deferred so that they may teach and do research at a university in science or engineering.
4. Undergraduate students in science or engineering may go back to college to complete their work for a bachelor's degree provided they have completed their junior year and have contributed two years or more of research to the war effort.

This new policy of Selective Service is expected to help greatly to relieve the critical shortage of scientists revealed by Dr. Vannevar Bush in his report last July to the President, as director of the Office of Scientific Research and Development.

Science News Letter, December 8, 1945

CHEMISTRY

Oil-Cracking Catalyst Formed in Tiny Balls

➤ TINY BALLS instead of tiny doughnut-shaped particles resulted from dropping a solution containing a new oil-cracking catalyst down a 200-foot elevator shaft in Chicago. The experiment was performed to find a way of making spherical particles of the catalyst instead of the usual ring-like particles resulting from other methods.

High-octane gasoline is made by cracking petroleum oils with a catalyst, a substance that has a chemical effect on the oils but does not itself undergo change. It is used over and over again, however, and finally wears away to dust. Tons are used annually, therefore the loss is appreciable.

The experiment was carried out by scientists of the Standard Oil Company of Indiana. One method of preparing a new catalyst studied by them is to spray it as a solution into a tower and then collect the fine solid particles at the bottom. Under a microscope, these particles are found to be tiny rings or doughnuts. The scientists knew that these ring-shaped particles would wear out more rapidly than spherical particles would.

The experiment in the elevator tower was a success; the particles resulting were tiny balls. The scientists are not certain that a 200-foot tower will be required, however, but think that perhaps spherical particles can be obtained by a lesser drop provided an upward current of warm air is used to dry the particles quickly.

Science News Letter, December 8, 1945

INVENTION

Power-Driven Chute For Unloading Coal

➤ COAL DELIVERIES, though anxiously sought, are frequently terrible nuisances when they finally come: the dirty black mountain, dumped unceremoniously on the sidewalk, being shovelled down the coal-hole or lugged in, a basket a time, on the shoulders of smudged and dusty laborers, is a too-familiar experience.

To obviate all this is the objective of a new power-driven conveyor chute, on which U. S. patent 2,389,779 has been granted to Eugene H. Heller of Arlington Heights, Ill. To make his chute rugged enough for its job, Mr. Heller has built it rather heavy. To make it maneuverable he has provided a pair of retractile wheels, on which it may be trundled to and from its carrying position on one side of the truck body. Once it is wheeled into unloading position, the drive pulley of its conveyor belt is hooked onto a power takeoff from the truck's motor, which will keep the coal moving rapidly through the chute when the end-gate is opened and it pours into the receiving hopper.

Science News Letter, December 8, 1945

PHYSICS

Stereophon System Now Available to Public

➤ INFORMATION concerning a German system for sound recording on film, together with details and diagrams, has been made available to the American public by the U. S. Department of Commerce. It is known as the Stereophon system.

It was developed by a German physicist, Dr. Carlheinz Becker, who started work on it in 1938 and proceeded without Nazi interference until 1942. Then he was ordered to convert the system into an explosion power recorder, for which it was well suited in many respects.

The Stereophon system is reported as having the important advantage of giving excellent three-channel reproduction of dynamic range and low noise level with the use of sound track having a total width of only 2.65 millimeters. It has a signal frequency range of 23 to 10,000 cycles, and a dynamic range of 60 decibels without resort to expansion and compression.

Science News Letter, December 8, 1945

ECONOMICS

Riches from Fishes

Fine leathers, vitamin A, oil, fertilizer and stock food come from the ocean depths. 4,500,000,000 pounds of fish produced annually in the United States.

By A. C. MONAHAN

➤ FINE LEATHERS for ladies' slippers, purses and belts may some day be obtained from ocean depths. Scaleless fish, such as catfish and sharks, have tough hides that before the war were used in wearing apparel, and soon may be used again. Improved tanning processes may give them a permanent place in the market.

Making leather from fish skin is just another step in the program of the commercial fishing industry which looks forward to the day when all former fish wastes will become valuable by-products. The industry wastes little now, hardly more than meat packers do of the cow or hog, but its goal is to use every bit of the fish for the products that will bring in the greatest financial returns. By-products mean the difference between profit and loss.

Commercial fishing is primarily for food, but some fisheries are interested in fish with little or no food value because of their value for oil, animal food and fertilizer. Some fish only for sharks to obtain the important vitamin A in their livers. But the rest of the shark is not wasted; it makes feed, fertilizer and leather.

Large Industry

The American fishing industry produces annually an average of about 4,500,000,000 pounds of fish, oysters, shrimp and other seafood, of which two-thirds by weight reaches the market as foods for humans and one-third as by-products. In canning and filleting, much edible flesh is unusable for those particular purposes and becomes shredded fish-flakes or canned dog rations. Some 600,000,000 pounds of former waste becomes meal and oil. Even oyster and clam shells find a use in poultry yards or in manufacturing processes.

Fish has long been used for fertilizer. Fish meal is food for hogs and cattle as well as for chickens. Cod liver oil, from livers formerly discarded, is a valuable medicine in the treatment of diseases causing emaciation. The soupfin shark's liver is particularly rich in vitamin A, although today dog-shark liver is a greater source of this vitamin because the poundage taken is much greater. Fins of the soupfin shark bring a high price from Chinese on the West Coast who make a finely flavored gelatine from its delicate fin-rays.

The United States has ample fishing resources. This is fortunate because Americans are fisheaters. The per capita consumption is not as great as it is in England, Japan and other island countries, but might approach the British consumption if inland Americans ate as much as those living within a few hundred miles of the oceans.

Americans in the interior have greatly increased their use of salt water fish since they have been able to buy the so-called filleted product all ready to cook. The average housewife never did like the job of "cleaning" fish. Incidentally, filleting fish in factories saves for factory by-products vast quantities of former household wastes dumped into garbage cans.

One reason that America has ample fish is because the country has vast underwater continental shelves extending many miles from much of its coasts. Fish must have food.

The necessary food is found in the plant and animal life in the relatively shallow waters over these shelves, and not in the deep water of mid-ocean. Plankton grow in these offshore waters, and much food is carried to them by entering rivers. Insects, grubs, worms and mollusks are more abundant. Fish eggs are more plentiful, and, for fish that like to eat fish, small varieties and young fish are available.

The North Atlantic fishing region, historically well known, includes the New England coast and the Newfoundland banks. It has a broad continental shelf that extends in places hundreds of miles to the sea, with several banks or underwater plateaus. The region is the great home of the cod, sacred to Massachusetts, but is more abundant in haddock, flounders, pollock and rosefish. The New England coast is the home of the lobster, clam and scallop.

The Middle Atlantic states region is best known for its oysters, crabs, shad, alewives and striped bass. It is noted also for its menhaden fishing, a fish taken almost wholly for the fish oil and meal industry.

The South Atlantic area, which includes the Gulf of Mexico, is also noted for oysters, crabs, and menhaden. The Gulf is the seat of the largest shrimp fisheries in the world. Both Middle and South Atlantic regions produce many other edible fish. Florida offshore waters are the hunting grounds for the tarpon, the famous six-foot fighting gamester.

Sardines, or pilchard, constitute the principal landings in the South Pacific or California region, but the tuna is an important catch. It is taken mostly in waters south of the United States-Mexico line. More fish in volume is now landed annually in California ports than even in New England.

Unlike conditions of the North Atlantic coast, waters rich in food for fish in the Pacific are not confined to the continental shelf but extend many miles to sea.

Salmon Area

The North Pacific fisheries region is off the coast of Oregon, Washington and British Columbia. It is a salmon area, with heavy production also of halibut, albacore, oysters, crabs, and sharks. It is the principal center of the shark-liver oil industry.

Alaska is one of the most important of the fishery resources of the United States and is noted particularly for its salmon. Salmon is America's most valuable fish catch, and about 90% of it comes from Alaska. Approximately 600,000,000 pounds of Pacific salmon are landed each year, 85% of which is canned. In addition to this commercial catch, millions of pounds are caught annually by sportsmen because salmon is a sport fish.

Salmon canneries use more of the fish than any other fish canning industry. On the other hand, they utilize less of the waste. Some of the roe reaches the market as caviar, and some of the fish waste is used for meal and oil, but the bulk is thrown away.

Inland waters furnish America with much fishfood. The commercial catch in the Great Lakes, the Mississippi and other lakes and rivers, excluding sea-run fish, is in the neighborhood of 175,000,000 pounds a year. No estimate is possible of the amount taken by individuals either for the family food or for sport. These inland bodies of water individually contain rather small populations of fish, but they add up to a vast total.

In the Great Lakes, the lake herring is the most important in point of weight taken annually. It lives off shore, feeding on plankton and on mollusks, crayfish, insect larvae and fish eggs. It belongs to the same family as the famous whitefish for which the lakes are noted. Whitefish, often called the king of fresh-water fish, has become severely depleted through wasteful fishing methods and inadequate protection. The annual catch now is only about one-fifth by weight of the catch of lake herring.

The annual commercial catch of fish runs from four to five billion pounds with a value to the fisherman of over $200,000,000. The American fishing industry produces some 3,000,000,000 pounds of food and 1,500,000,000 pounds of by-products. It provides annually over 27,000,000 gallons of ordinary fish oils and an average of 1,100,000 gallons of liver oils.

The American fishing industry employs over 65,000 regular fishermen working on vessels, row-boats or from the shore, and 60,000 others engaged part time in commercial fishing. In addition many thousands are employed in canning and other processing plants. The total capitalized value of United States fishery resources is estimated, by government authorities, as $5,855,000,000.

Science News Letter, December 8, 1945

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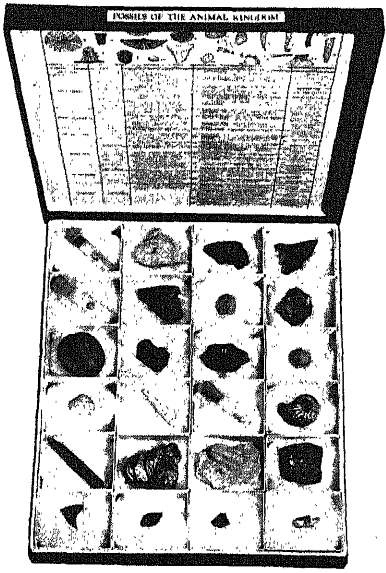

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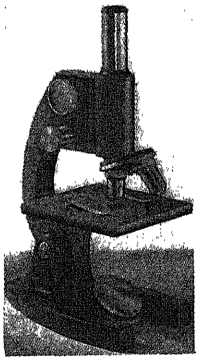

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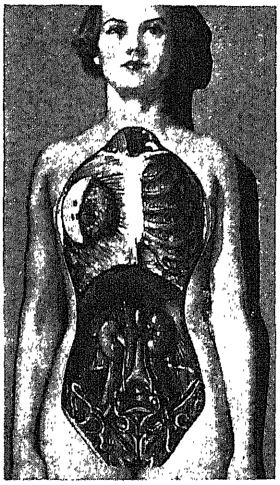

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Do You Know?

Brazil has begun the manufacture of *glass* for domestic needs.

The *cuma* is a large knife used extensively in crop cultivation in Salvador.

Books in the English language are in demand in Sweden.

Calcium in the soil is the most important element in influencing the development and growth of peanuts.

Soot-clogged *chimneys* are a serious fire hazard when the first hot furnace fires are started in the fall.

Liberal amounts of *vitamin A* tend to postpone aging and prolong life, certain scientists now say; their tests were made on rats.

Tin was discovered in Yunnan, China, over 2,000 years ago but commercial mining was not begun until about 1,000 A.D.

Grain found in vases in ancient tombs is practically carbonized from age and will not sprout, in spite of numerous stories to the contrary.

Cornstarch ordinarily consists of two fractions, amylose and amylopectin, but a new variety of corn has been developed in which the starch is all amylopectin; it is a waxy maize and can be used as a substitute for tapioca.

Automobile *tires* built with rayon instead of cotton provide considerably greater wear because the rayon, although lighter, is stronger, and generates less heat because it creates less friction in flexing.

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GENERAL SCIENCE

ORG War Workers

Chemists, physicists, mathematicians and other scientists did their fighting with test-tubes, oscilloscopes, slide-rules and brains.

➤ WARTIME work of a scientific "silent service" in the Navy, more silent even than the submarines, has been partially disclosed. Chemists, physicists, mathematicians and other scientists of the Operations Research Group ("ORG" for short) did their fighting with test-tubes, oscilloscopes, slide-rules, many other kinds of scientific apparatus; but their chief weapons were their brains.

Their task was not so much the development of new weapons and ways of warfare—this was done by other groups of scientists—as the analysis of the tactics of using our new and secret weapons and the devising of countermeasures when our enemies sprang disagreeable new surprises.

Seventy-three scientists were recruited for ORG from a score or more of colleges, universities and research institutions, from the statistical departments of several insurance companies, from a few industrial firms, from government research laboratories, as well as from the Army and the Navy. Headquarters were in Washington, under the leadership of Prof. Philip M. Morse of the Massachusetts Institute of Technology. However, the tasks of ORG were far from being exclusively swivel-chair assignments. ORG men went out into the combat areas to check up on their own work. They flew in planes over enemy waters, they went on missions in submarines, they cruised in carriers that were attacked by Kamikaze flyers.

Some of the accomplishments of ORG, as listed by the Navy:

Trapping German submarines that were slipping into the Mediterranean through the Strait of Gibraltar.

Stopping German blockade runners carrying rubber, tin and other desperately needed war materials from Japan.

Devising an effective countermeasure to the deadly German acoustic homing torpedo, on which the Nazis had pinned their last hopes of winning the Battle of the Atlantic.

Drawing up a set of tables to enable anti-submarine craft to track down enemy submarines, even after hours of apparent escape.

Finding the "thin spots" in Japanese anti-aircraft defense, enabling our bombers to get in and attack with minimum losses.

Solving enemy methods of attack on our own submarines, thus cutting down our losses and increasing effectiveness of our attack.

The services of the Operations Research Group were furnished to the Navy by the Office of Scientific Research and Development, at first through a contract between Division 6 of the National Defense Research Committee and Columbia University, later through the Office of Field Service.

Institutions and organizations from which ORG drew scientific staff members were: Massachusetts Institute of Technology, Columbia, Harvard, Stanford, Northwestern, Notre Dame, McGill, Case, Antioch, Lawrence, Purdue, Kent, Iowa State; the Universities of California, Washington, Missouri, Michigan, Tennessee, and Oklahoma; the Rockefeller and Carnegie Institutes and the Institute of Gas Technology; the New York Public Library, the Equitable, Metropolitan, John Hancock, Sun Life, Union Labor Life, and Massachusetts Indemnity Insurance Companies; the Westinghouse Electric and Manufacturing Company, L. Bomberger and Company, and the American Thermos Bottle Company; the Insurance Department of Oregon; the State Department; National Bureau of Standards; Federal Communications Commission; the Army and the Navy.

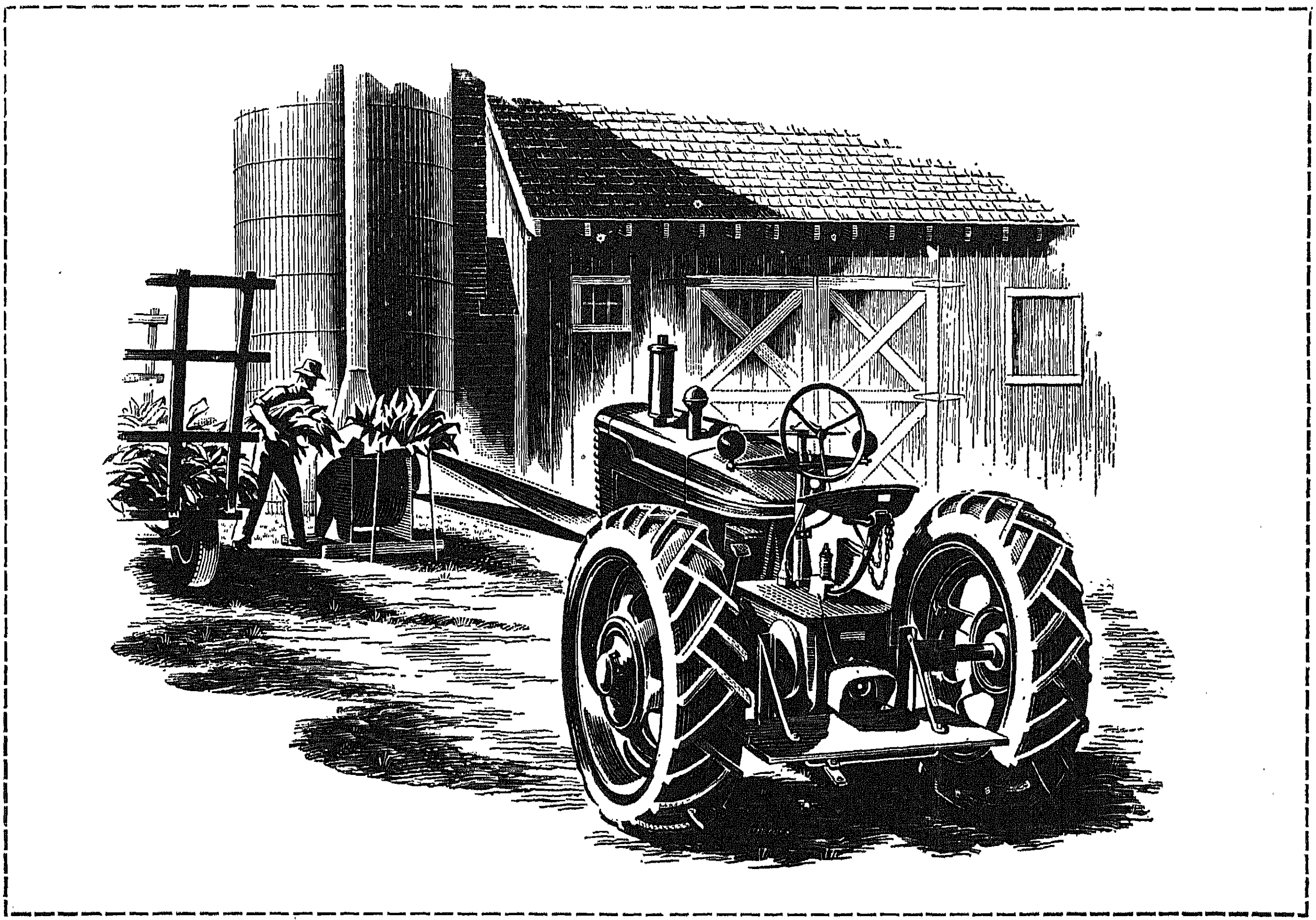
Science News Letter, December 8, 1945

NUTRITION

Baked Potatoes Should Be Served at Once

➤ BAKED POTATOES should be served as soon as they are done, if you are to get the full benefit of their vitamin C. Potatoes that stood in the kitchen for half an hour after baking lost a third of their vitamin C, tests at the Illinois and Idaho Agricultural Experiment Stations indicate. Those that stood an hour lost 50%. All of the vitamin C was lost from baked potatoes allowed to stand for four hours.

Science News Letter, December 8, 1945



HORSES THAT DO THE CHORES—AS WELL AS PLOW

TIME was when a farmer was glad to have a team of good horses to do his work. Today, in his tractor, the American farmer has anywhere from ten to forty horsepower.

And these "horses" can do a lot more than pull a plow or other field rig. They can grind feed, fill silos, saw wood, lift hay, clean barns and do dozens of other jobs. The modern tractor is really a portable power plant.

But tractors haven't always been so versatile. Only a little more than a decade ago, tractors were generally powered by cumbersome, hard-to-start, slow-moving engines burning kerosene or other low-grade fuels. Then the high compression principle, already developed in automobile and airplane engines, was adopted by the farm machinery industry.

Engines were redesigned to take advantage of gasoline, and great increases in the power and flexibility of tractors resulted . . . giving the farmer a ready, convenient source of power at all times. In this evolution of the present compact, inexpensive tractor the Ethyl Corporation was privileged to play a unique part—though we neither manufacture tractor engines nor refine gasoline.

Our product is the antiknock fluid used by practically all petroleum refiners to improve the antiknock quality of their gasoline. Higher octane gasoline, in turn, permits the building of more efficient engines. In order that the ultimate user of power—in this instance, the farmer—may realize the greatest benefit from antiknock fluid, our research engineers work with both engine builders and petroleum refiners in finding answers to the many complex problems of engines, fuels and lubricants. The modern high compression tractor was a direct product of such cooperative work.

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BOTANY

NATURE RAMBLINGS

by Frank Thone

Life in Winter

➤ WINTER, we are accustomed to assume, is a time of frozen paralysis for plants in the snowy parts of the world. Leaves are gone from most of the trees, no flowers bloom; the short-lived herbs, that complete their lives, from seed to seed, between spring and fall, are all dead and withered. Poets of the more sentimental school have made great capital of winter as a time of desolation and death.

If we go and take a look for ourselves, however, instead of sitting by the fire and indulging in thanatopsian musings, we are likely to see a great deal more of life in the seeming-dead woods and fields than a superficial observer, going home in a shivering hurry, would ever suppose.

Evergreen trees—pines and spruces and firs and junipers—are of course obvious to everyone. So much so, indeed, that they have been taken as the symbols of hope and expectation of a springtime resurrection: that is the basis of our use of them for Christmas trees.

But down on the ground, among the dead leaves or even boldly taking the worst that winter has to offer right out in the open, are all kinds of smaller evergreen plants. Several species of fern (one of them even named Christmas fern), almost all the mosses, trailing arbutus, hepaticas, round-leaved harebell, scrambling vines like the catbriar, tough dwarf shrubs like bearberry, rosette-forming weeds like mullein and dandelion, and a hundred other hardy humble evergreens, keep their leaves all winter long.

Science News Letter, December 8, 1945

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ELECTRONICS-AERONAUTICS

Towering Walls of Light To Flank Landing Strip

➤ A NEW AIRFIELD runway lighting technique, involving the use of two towering walls of light flanking a landing strip, is planned for New York's new Idlewild municipal airport, it is reported. The sheets of light, extending high into the sky, will help planes to make safe landings in foggy weather. It is a scheme never before tried as a landing aid, it is claimed.

The new landing guide is so planned that the approaching pilot will see the runway as a dark area between twin sheets of controlled light that shoot upward without glaring into his eyes. The runway surface will be illuminated by smaller lamps, to the low surface brightness preferred by aviators.

"Each unit of the new system of landing lights will include 300-watt 'sealed beam' floodlight with a prismatic lens which will fan out light parallel to the runway," W. A. Pennow of Westinghouse Electric Corporation states. "The units will be spaced 200 feet apart according to present plans, with provisions for 100-foot spacings in the future. The fanning effect will create an interlocked 'wall' of light a short distance above the runway."

The floodlight unit will have a contact light mounted on the same base so that the walls of light can be used in bad weather and normal runway lighting in good visibility.

The new system was conceived by Adam Kopf, lighting expert of the office of Edward A. Sears, electrical consultants in New York. Mr. Kopf refers to the system as an "aisle of light." A similar curtain of light was used, he said, at a Long Island amphitheater to mask the stage from the audience. Westinghouse engineers transformed Mr. Kopf's idea into actual electrical fixtures for use on the runway.

Science News Letter, December 8, 1945

It is believed that *scurvy* did not afflict infants until bottle feeding was practiced.

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• Books of the Week •

ATLAS OF SURGICAL APPROACHES TO BONES AND JOINTS—Toufick Nicola—*Macmillan*, 218 p., illus., $5. A systematic study with lucid illustrations by the author of the anatomical approaches to bones and joints. Foreword by Maj. Gen. Norman T. Kirk, Surgeon General of the U. S. Army.

BRITAIN AGAINST GERMANY, 1939-1945: A Record in Pictures—*British Information Service*, 127 p., illus., free. A review of Great Britain's own part in the victory over Germany and her European satellites.

DESTROYERS IN ACTION—Richard A. Shafter—*Cornell Maritime*, 246 p., illus., $2.50. Description of the many and varied ways in which destroyers are employed in wartime, plus many interesting items concerning their historical background.

EDUCATION IN CHILE—Cameron D. Ebaugh—*Gov't Printing Office*, 123 p., 25 cents. This booklet is part of a program to promote understanding of educational conditions in the American countries and to encourage cooperation in the field of Inter-American education.

THE ELEMENTS OF GLASS TECHNOLOGY FOR SCIENTIFIC GLASS BLOWERS—W. E. S. Turner—*Glass Delegacy of the University of Sheffield*, 31 p., 3/6.

ESSENTIALS OF NEURO-PSYCHIATRY—David M. Olkon, *Lea and Febiger*, 310 p., illus., $4.50. Presents the fundamental principles for the evaluation of mental disorders based on genetic, psychologic, psychiatric and general medical information.

FUN WITH ELECTRONS—Raymond F. Yates—*Appleton*, 157 p., illus., $2.75. A blueprint of electronics for any teen-ager who likes to see how and why things happen.

PETROLEUM PERIODICALS—Margaret M. Rocq, Elizabeth Nutting and Katherine Karpenstein—*Special Libraries*, 18 p., 10 cents.

THE PLACE OF SCIENCE IN THE EDUCATION OF THE CONSUMER—The National Science Teachers Association—*The Consumer Education Study*, 32 p., free. A statement prepared for the Consumer Education Study of the National Association of Secondary-School principals.

A PRIMER OF ELECTROCARDIOGRAPHY—George Burch—*Lea and Febiger*, 215 p., illus., $3.50. Enables the student who is entirely unfamiliar with the subject to acquire fundamental knowledge of electrocardiography in the most direct manner.

THE SCRIPTA MATHEMATICA STUDIES: A Collection of Papers in Memory of Sir William Rowan Hamilton—*Scripta Mathematica*, 82 p., $1.50. Contains papers dealing with a number of important phases of Hamilton's life and scientific activity.

THIS IS SCIENCE—*Association for Childhood Education*, 43 p., 50 cents. Prepared to meet a widespread demand by teachers who wish to learn how the field of science may best be used to enrich the experiences of their pupils.

TOMORROW'S TRADE—Stuart Chase—*Twentieth Century Fund*, 156 p., $1. No. 5 in the series of guide lines to America's future.

Science News Letter, December 8, 1945

AERONAUTICS

Flies 500 Miles an Hour

The XP-47J, conventional propeller-driven plane has set a record which remains unbroken, it is revealed with removal of war secrecy.

➤ FLYING over 500 miles per hour in level flight, the XP-47J, a conventional propeller-driven plane set a record which remains unbroken, the Air Technical Service Command revealed when war secrecy on this test was partially removed.

An experimental XP-47J underwent tests on Aug. 4, 1944, at Farmingdale, Long Island, before Army observers who watched it hurtle over 500 miles per hour through the skies, faster than any other conventional propeller-driven craft known. This speed was beyond that previously considered possible by aircraft experts for such type planes.

Designed and built by the Republic Aviation Corporation, the XP-47J was never produced beyond the experimental stage. Only one "J" was ever built because mass production would have required a complete retooling program. However, the experimental plane was an important development because its distinctive features and improvements were later incorporated in the P-47M Thunderbolts and finally the long range P-47N's. The army felt it wiser to continue production of the Thunderbolts at that late date than to begin a new program.

The XP-47J is similar to the thousands of early P-47D planes built up to that time. Its high rate of climb and tremendous speed made it an excellent interceptor fighter type. It has the same power plant later installed in the P-47N's, the Pratt and Whitney R-2800 C type engine, and a General Electric CH-5 turbo-supercharger. At a pressure altitude of 34,000 feet such features permit the development of 2800 horsepower under war emergency power conditions.

Science News Letter, December 8, 1945

EDUCATION

Armed Forces Education Will Be Investigated

➤ EDUCATION as practiced in the armed forces during the war will be investigated by the American Council on Education under a Carnegie Corporation of New York grant, in order to find its implications for civilian education.

For this purpose $75,000 was appropriated as a part of the $1,002,500 of 1944-45 grants summarized in the annual report of President Devereux C. Josephs. Over half of the total was devoted to emergency war grants that normally would not fall into the Carnegie Corporation program. These included $225,000 to the American Red Cross and $150,000 to the National War Fund.

Another large grant was $75,000 to the Carnegie Foundation for the Advancement of Teaching for its graduate record examination project.

Science News Letter, December 8, 1945

One reason why *rayon tires* have superior strength is that rayon is produced in long, continuous strands while natural fibers are short and must be twisted together to form yarn.

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•New Machines and Gadgets•

ELECTRONIC fish fence, to keep fish from escaping from hatcheries in outgoing waters, consists of one or more rows of metal electrodes through which electric impulses are sent to set up an electric field in the water. Fish entering the charged area receive an effective but harmless shock.

Science News Letter, December 8, 1945

CARPENTER'S level is a long metal frame with parallel surfaces between which are inserted three rings, each holding two liquid vials similar to those in the ordinary level. Two of the vials are set at 45 degrees, two at plumb, and two at level.

Science News Letter, December 8, 1945

MECHANICAL floor-scraper, to resurface concrete floors, resembles the ordinary hardwood floor renovator but has, on its horizontally revolving cutter, tips of cemented carbide, a relatively new metal alloy harder than steel. Embedded dirt and chips are quickly removed.

Science News Letter, December 8, 1945

RUBBER heating pad, heated electrically without the use of wire coils, contains certain chemical compounds to make it conduct electric current throughout. It consumes less electricity than other heaters constructed with coiled wire.

Science News Letter, December 8, 1945

WALNUT-SIZE fluorescent light bulbs have long-life and cost little to operate. They were developed as warning lights for use in homes, to mark stairways and other dark places where mishaps in the dark might cause injury. The picture shows its soft light in a home nursery.

Science News Letter, December 8, 1945

LABORATORY cabinet, operating with dry ice, is designed to satisfy all the cold-test conditions in present-day testing techniques, from minus 90 to 220 degrees Fahrenheit. Materials inside are visible through a window of multiple panes, being lighted with tiny fluorescent lamps.

Science News Letter, December 8, 1945

LIGHT-WEIGHT boats, with hulls made in one piece of molded plastic plywood by the so-called Duramold process, are designed for sportsmen. The eight-foot dinghy can carry a load of 1,000 pounds.

Science News Letter, December 8, 1945

COAL PLANER, a radically new type of coal mining machine used in German mines during the war, eliminates the costly tasks of cutting, drilling, blasting and loading. The plow-like machine shaves coal from an underground seam, working on the same principle as the carpenter's wood plane.

Science News Letter, December 8, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin* 288.

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Question Box

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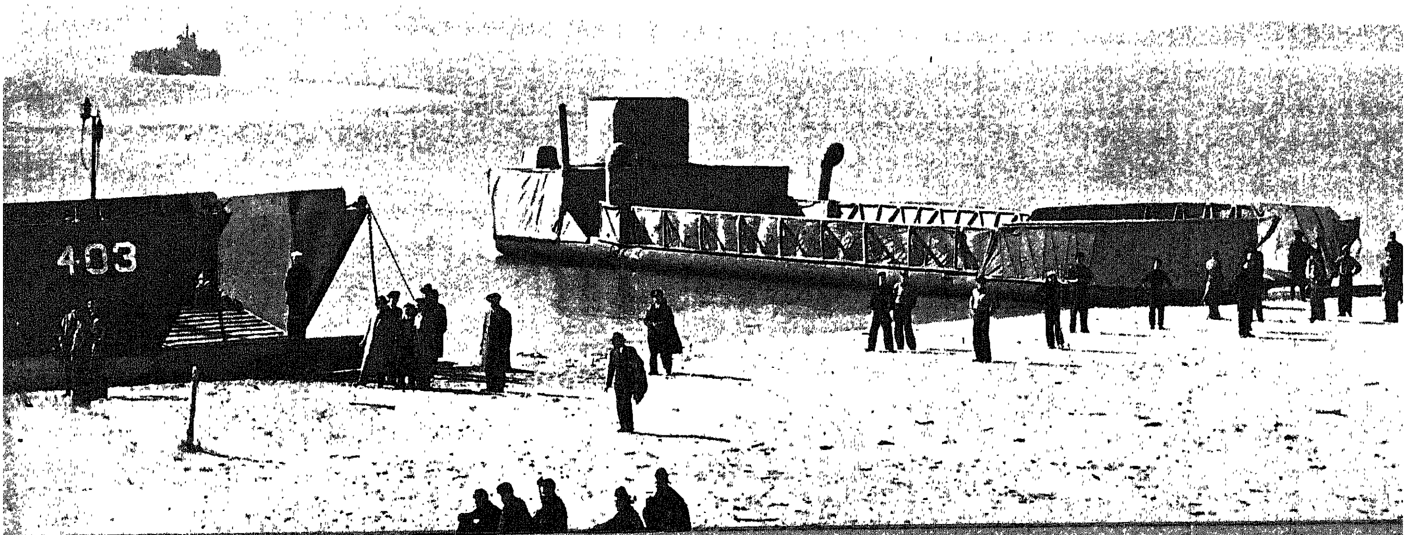


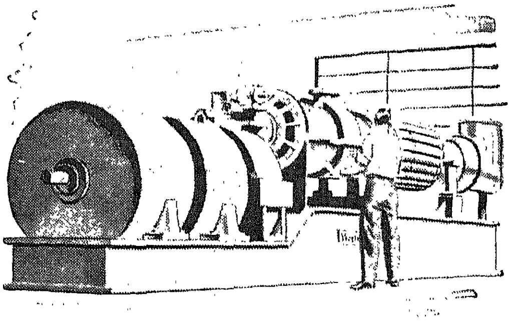
Deceiving Decoy

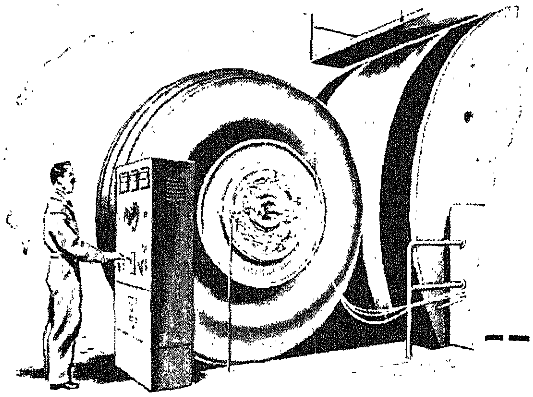
See Page 374

A SCIENCE SERVICE PUBLICATION

In a laboratory a SCIENTIST experiments with a new gas turbine—using heat-resisting alloy blades that are far stronger, at 1100°F., than *ordinary* steel at room temperature.

...the name on the GAS TURBINE is Westinghouse.





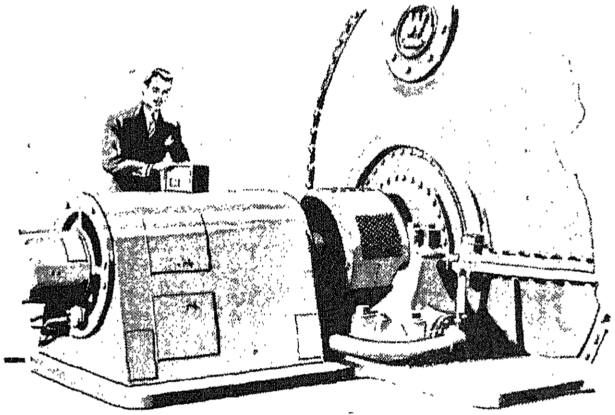
On a special machine a TESTER employs a Rototrol* for smoothly accelerating a large flywheel, used in determining the wear-resisting qualities of tires and brakes—for huge air transports of the future.

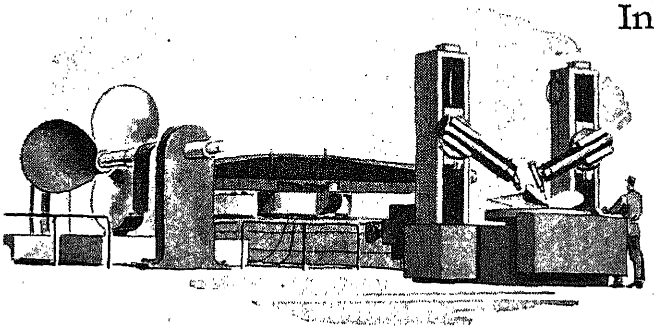
...the name on the ROTOTROL is Westinghouse.

*Registered Trademark

In a power plant an ENGINEER uses a Vibrograph to "take the pulse" of a turbo-generator . . . recording the smallest vibrations as a trace on a film.

...the name on the VIBROGRAPH is Westinghouse.





In a manufacturing plant an OPERATOR uses an electronic control to regulate the movement of milling cutters—for accurately machining irregular contours on giant ship propellers.

. . . the name on the ELECTRONIC CONTROL is Westinghouse.

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BIOCHEMISTRY

New Antibiotic

Penicillin-like substance, effective against germs of boils, tuberculosis and undulant fever, found in bacteria that cause bee disease.

➤ NEWEST addition to the rapidly growing family of antibiotics, or germ-stopping substances of the penicillin family, has been found in pure cultures of the bacteria that cause one of the most troublesome of bee diseases, American foulbrood. Discovery of the new antibiotic is announced by Dr. E. C. Holst of the U. S. Department of Agriculture. (*Science*, Dec. 7)

Dr. Holst was led to suspect that this bacterium might produce an antibiotic by the fact that honeybee larvae dead of the disease almost invariably contain this microorganism and no others, suggesting that the causal bacterium produced something that would keep competing species from growing. Test plantings of the foulbrood bacteria in growths of a considerable number of other bacteria proved this to be the case: the foulbrood bacterial growth would surround itself with a zone in which the other species could not grow.

Among the microorganisms that were thus prevented from muliplying in the presence of foulbrood bacteria were the germs of common boils (also the cause of food-poisoning in cream pastries); tuberculosis, both human and bovine strains; undulant fever; also a number of bacterial species that do not ordinarily cause disease.

Although the new antibiotic substance has not yet been isolated in pure state, some facts have been determined about it. It is soluble in water but not in the alcohols or other organic solvents. It does not pass through a membrane of cellophane or parchment, which indicates that its molecules are at least fairly large.

It can stand a moderate degree of heat, and can be sterilized by pasteurization without appreciable loss of potency. Age does not seem to harm it: foul-brood specimens four years old yielded active preparations. Glucose hinders its action, but ordinary cane sugar does not, nor does glycerin. It had some poisonous effects when injected into mice, but gave no evidence of toxicity when fed to them by mouth.

Dr. Holst states that experiments to determine possible use in the treatment of disease are in progress.

Science News Letter, December 15, 1945

INSURES COMFORT—The cabins of Pennsylvania Central Airlines Capitaliner planes are being lined with down-like glass fiber blankets to protect passengers from both noise and cold. The blankets are similar to those used during the war to provide sound and heat insulation for multi-motored bombers.

MEDICINE

Relief From Hayfever

New drug brings prompt relief in hives and hayfever. While not a cure, it may point the way to even better drugs for allergic sufferers.

➤ VICTIMS of two kinds of allergic suffering, hayfever and hives, may in future be getting relief from their misery by taking two or three pills daily of a new drug, it appears from studies reported by Dr. Earl R. Loew, of the University of Illinois College of Medicine, and by a group of scientists at the Mayo Clinic.

The new drug is known as benadryl. Its chemical name is beta dimethylamino-ethyl benzhydryl ether hydrochloride. It was first made, for other purposes, by Dr. George Rieveschl, Jr., of the Parke, Davis and Company laboratories in Detroit. Dr. Loew and associates tested its action and degree of poisonous effect on laboratory animals and Dr. Loew, the Mayo Clinic group and Drs. A. C. Curtis and B. B. Owens of the University of Michigan have since tried it on human patients.

Benadryl is not a cure for hayfever or hives. Its action is to relieve the stuffy nose, smarting, watering eyes, itching and other symptoms of these allergic disorders. Hayfever patients presumably will have to take it daily during their seasonal bouts of suffering. Victims of chronic hives treated at the Mayo Clinic broke out again with bumps, swellings and itching when they stopped the drug, so apparently they also, including sufferers with angioneurotic edema, will have to continue taking the drug daily to be assured of relief.

Some asthma patients were helped by the drug, but others were not. The reason for this and various other features of the drug need further study, it is pointed out in the reports from the Mayo Clinic.

A wide margin of safety exists between the dose needed to relieve the patient and that which would produce serious toxic effects. Sleepiness, dizziness and a dry mouth may be felt after taking the drug but these symptoms quickly go away.

Relief of the hives and hayfever symptoms comes quickly, usually within 30 to 60 minutes after taking benadryl. The relief lasts for several hours, so that three doses daily may be enough.

Benadryl is believed to achieve its results because of an antihistamine action. Histamine is a chemical normally present in the body. It is believed that overproduction of this chemical causes the symptoms of hayfever and other allergies. Exactly how this happens is not yet known.

The development of benadryl, and of a series of other antihistamine drugs which French scientists have been developing and investigating before and during the war, seem to point toward even greater future success in relieving allergic sufferers.

Mayo Clinic scientists reporting on benadryl are: Drs. T. W. McElin, Bayard T. Horton, P. A. O'Leary, F. M. Farber, G. A. Koelsche, L. E. Prickman, H. M. Carryer, H. L. Williams, G. B. Logan, and C. F. Code.

Science News Letter, December 15, 1945

ELECTRONICS

Locates Storm Areas

Static Direction Finder, using cathode tube similar to radar and perpendicular receiving loops, locates storms within a radius of 2,000 miles.

➤ STORM areas within a radius of 2,000 miles may be located by a new special electric equipment called a Static Direction Finder, which was used with success in the Pacific war theater, it is now revealed. The apparatus consists of a cathode-ray indicating tube similar to those used in radar and television, and two mutually perpendicular receiving loops and amplifiers.

For a long time it has been known that certain types of storms are accompanied by severe electrical disturbances, which, incidentally, are responsible for the crackling and grinding noises often heard by radio listeners. In the Static Direction Finders, called Sferics for short, these disturbances give a visual indication of a storm's direction.

An incoming static signal to the direction finder produces a straight-line flash on the face of the cathode ray tube. The angular position of this flash gives the direction of origin of the static crash. Several stations in a network taking observations at the same time on the same flashes can locate their source and spot the storm position within a 2,000-mile radius.

In its advance stages of development the direction finder was tested at the Army Air Force Center, Orlando, Fla. Although finding its first use in warfare, Sferics began as a scientific project at the University of Florida in 1934. At that time, Dean Joseph Weil at the college of engineering started work on tracking hurricanes by means of the static associated with them. Similar work was also undertaken on thunderstorms both in this country and abroad.

The U. S. Weather Bureau and the U. S. Navy soon became interested in the work and helped obtain funds and equipment to carry on the study. Apparatus built by the English National Physical Laboratory was secured through the Navy. A network of stations in Florida and Cuba was put into operation with improved equipment constructed at the University.

Eighteen of these Static Direction Finders saw action during the war. They proved of high value, Army officials state, in securing information of weather and bombing conditions over enemy territory, and in routing planes around storm areas.

Science News Letter, December 15, 1945

ASTRONOMY

Comet Friend-Peltier To Become Brighter

➤ THE COMET Friend-Peltier will pass nearest the sun on Dec. 17, according to an orbit computed by Dr. L. C. Cunningham, of Aberdeen Proving Grounds, and reported to Harvard Observatory Clearing House. This is the comet discovered by amateur astronomer Clarence Friend of Escondido, Calif., on Nov. 22 and independently observed by Leslie C. Peltier of Delphos, Ohio, two days later.

Indications are that the comet will become brighter than it was at discovery, when it was of the seventh magnitude, just below the limit of naked eye visibility. It is approaching so close to the sun in the sky, however, that it will practically be impossible to observe for several weeks to come. Its brightness after that time cannot be predicted with any certainty.

The present path of the comet is carrying it southward from the constellations of Corona and Hercules, where it was when discovered, into Ophiuchus and Sagittarius. It will pass the perihelion point in its orbit, when it will be nearest the sun, on Dec. 17, and after that time will be observable, if at all, in the southern hemisphere.

The apparent path of the comet as computed by Dr. Cunningham, when plotted on a map of the sky, swings in an arc shortly after the comet has gone south of the ecliptic. Probably the path of the comet through the latter part of December and the early part of January will nearly parallel the ecliptic, and the comet will take some time to get far from the sun. By then its distance from the earth will have increased considerably. At perihelion the comet will be about 18,000,000 miles from the sun but many times this distance from the earth.

Science News Letter, December 15, 1945

SCIENCE NEWS LETTER

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MEDICINE-PHYSICS

Betatron for Cancer

Improvement in treatment will result when scientists find a way to canalize the high energy electrons outside of the vacuum chamber.

➤ SUBSTANTIAL improvement in the treatment of deep-seated internal cancers will be possible when scientists find a way to canalize the high energy electrons of the betatron outside of the vacuum chamber, Dr. G. Failla of Columbia University told members of the American Physical Society at their meeting in St. Louis.

In time it will be possible, he said, to achieve this canalization so that the electron beam will deliver its maximum energy to the cancer with very little beyond that depth. The danger of damaging by overirradiation normal tissues in the neighborhood of the internal cancer will then be less.

The betatron makes it possible to treat cancer with X-rays of 20 million to 100 million volts. With all X-rays available heretofore, Dr. Failla explained, the skin receives more ionizing energy than the underlying tissues traversed by the beam of radiation, but with the multimillion volt X-rays produced by the betatron, the situation is reversed. The highest concentration of energy occurs at a considerable depth below the surface of the skin. Beyond this level the dose drops slowly. A beam of multimillion volt X-rays traversing the human body is therefore more apt to damage the skin area through which it leaves the body than the skin through which it enters it. All organs in between will receive larger doses than the skin on either side. Whether they are damaged or not will depend on the magnitude of the treatment and on their respective radiosensitivities.

Damage to normal tissues, therefore, will continue to be the limiting factor in the treatment of deep-seated tumors.

The importance of taking greater care to protect persons working with the betatron than is necessary for those working with ordinary X-ray machines was stressed by Dr. Failla. While the accepted permissible dose for continued exposure of the whole body to ordinary X-rays is one-tenth of a roentgen, the safety limit for betatron workers, Dr. Failla believes, should be put at one-fifth of this, or 0.02 roentgen per day.

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ZOOLOGY

Dr. Henry B. Ward Dies

➤ FISHES—other wildlife, too, but especially fishes—lost a good friend when Dr. Henry B. Ward, emeritus professor of zoology at the University of Illinois, died in his Urbana home Nov. 30. The octagenarian scientist had spent a long working lifetime as their frequent advocate; since they have no voices of their own he spoke for them when their rights and interests were threatened. When a dam was planned that would cut off an important fish migration route, he could be depended on to put up a fight for a practicable fish ladder or other means to let his friends find their way up to their spawning beds. He had a great deal to do, too, with the growing public consciousness that neither we nor the fish need to put up with waste-polluted streams nd lakes.

Dr. Ward's interest in fishes was not merely that of a nature-lover or of a fisherman, though he was both of these. His acquaintance with fishes was the more intimate kind that comes of close and accurate knowledge of their way of living. He did pioneer research work, for example, in exorcising the mystery of salmon migration: salmon, he demonstrated, when confronted with the choice of two branches of a stream to ascend, always chose the one with the colder water. There is still dispute whether this choice is a simple temperature reaction or whether other factors are involved, but Dr. Ward did discover the fact.

Internal troubles of animals in general claimed Dr. Ward's major attention during his many years as head of his department at the University of Illinois. He led in the development of parasitology as a distinct discipline within the house of zoology, and was responsible for the training of scores of successful research workers in this perhaps messy but nonetheless important and necessary subject. He founded the American Society of Parasitologists and was editor of its journal for nearly a generation.

DR. HENRY B. WARD

Honored by many American and foreign scientific groups for his achievements in the most difficult kinds of research, Dr. Ward was nevertheless no dweller in an ivory tower. He knew the need for bringing the facts and interpretations of science home to the common man, and understood something of the technique of doing so, too. He participated actively in the affairs of the Izaak Walton League and the National Wildlife Federation, both of which organizations correlate the efforts of scientists and laymen for the benefit of wildlife. For a decade before his death, he was a trustee of Science Service.

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In general *fishes* are boat-shaped, adapted for swift passage through the water, with their broadest part in front of the middle, leaving the compressed paddle-like tail as the chief organ of locomotion.

Sticklebacks, pugnacious fish of Hawaii, are used by natives to catch others; one, caught alive, is suspended by a string among the rocks where others live and those that come out to fight the captive are drawn out with a net.

ORDNANCE

"Ghost Army" Victories

Army of inflated pneumatic tubes and painted fabric won victories without fighting; true nature of decoy trucks and ships undetectable within a few hundred yards.

See Front Cover

➤ AN AMERICAN "ghost army" that never fought but won decisive victories has been revealed by the Army. Made up not of flesh and metal, but of inflated pneumatic tubes and painted fabric, this decoy army included men who couldn't move, two-and-a-half-ton trucks weighing only 86 pounds and field artillery that couldn't shoot. The picture on the front cover of this SCIENCE NEWS LETTER shows a decoy LCT and an actual LCT.

Enemy reconnaissance many times reported large-size mechanized units which in reality were only decoys constructed to stimulate 19 different weapons and pieces of equipment used by our forces. Set up during the night by specially trained units, the true nature of these decoys was undetectable even within a few hundred yards.

Two or three men could unfold a mass of tubes and cloth from an 18-cubic-foot bundle and within ten minutes a two-and-one-half-ton truck would stand beside them. The structural system of pneumatic cloth cemented to the tubing resembled perfectly from both the air and the ground the bulk and silhouette of its prototype.

Trucks of various capacities, tanks, antiaircraft and anti-tank guns, landing craft tanks, as well as various field artillery pieces, could be blown up with compressed air like gigantic Tony Sarg figures to represent large convoys or emplacements. An army could move to aid an endangered sector leaving behind what the enemy took to be fully equipped divisions. A weakened position was thus undetected and enemy breakthroughs were prevented.

Ten per cent of the number of men from a division were required to erect and maintain the decoys and create the appearance of normal activity. Many of the pneumatic decoys could stand ten days without repairs, but changes in temperature as well as handling methods made it necessary to keep a constant check and maintain correct pressure.

The idea for such decoys came out of the North African campaign, during which discarded barrage balloons were made into dummies to confuse the enemy. Success there made it advisable to perfect the method. The Engineer Board at Ft. Belvoir, Va., took the task in hand. By November, 1943, units were in production. Shortly after D-day completely equipped and trained forces were in action.

The problems of decoy construction were many. Proper fabrics coated with neoprene had to be developed. Four-inch-diameter tubing had to be constructed that could be bent and held in desired shapes. The decoys had to be easily erected and dismantled in the dark. They had to be of minimum bulk and weight. After extensive tests with various constructions the pneumatic construction was found more suitable.

Lace, theatrical equipment, tire and rubber companies aided in the production. The first large pneumatic decoy was an LCT. These were most effectively employed to give the enemy misleading information on ports of embarkation. Loaded with other decoys the ruse was even more successful.

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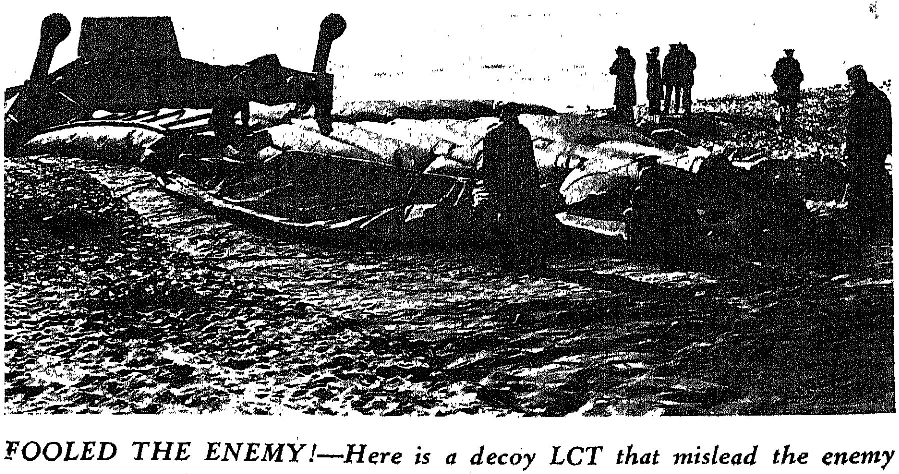

FOOLED THE ENEMY!—Here is a decoy LCT that mislead the enemy on Allied ports of embarkation shown being assembled.

CHEMISTRY

DDT Patent Reissue Becomes Best Seller

➤ IT IS NOT often that the U. S. Patent Office publishes a best seller, but they got out one last week—somewhat to their embarrassment when requests for copies continued to come in and they could not supply them immediately.

The unforeseen best seller was a reissue of the American patent on DDT—officially Reissue 22,700, to Dr. Paul Mueller, assignor to J. R. Geigy, A. G., Basel, Switzerland. Dr. Mueller is the young Swiss chemist who discovered the insecticidal value of DDT, and the Geigy firm is the original manufacturer. Reissue of the patent was necessary to correct some omissions in the first U. S. patent, No. 2,329,074, issued Sept. 7, 1943.

Following the usual custom, the Patent Office ordered 400 copies of the reissue—and had orders exhausting the supply before noon on the day they were printed. A new printing has been ordered.

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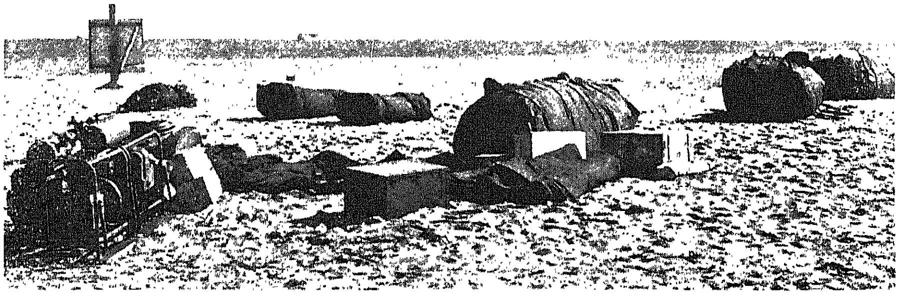
Fall blooms on *roses* come more slowly and last longer than earlier blooms.



QUICKLY ASSEMBLED—The three sections of the pneumatic LCT packed in their compact bundles prior to inflation.

ENTOMOLOGY

612 Repels Mosquitoes

New war-born repellent kept yellow fever mosquitoes away for 20 hours under laboratory conditions; it is also effective against chiggers.

➤ CHIGGERS as well as mosquitoes are discouraged in their nefarious business by the war-born insect repellent known as 612, Dr. Philip Granett of Rutgers University told fellow-entomologists at the New York meeting of the American Association of Economic Entomologists. As a chigger repellent, 612 is most effective when applied to the clothing; its effect then lasts for several days.

Under standardized laboratory testing conditions, one application of 612 on a limited skin area kept mosquitoes away for an average of about nine hours; applied in more liberal quantities, it held off *Aedes egypti* (the yellow-fever mosquito) for as much as 20 hours. In the field, effectiveness does not usually last so long, because some of it is removed by rubbing against foliage and other objects, as well as by the user's own perspiration.

Chemically, the new repellent is 2-ethylhexanediol-1, 3; its convenience-designation, 612, is simply its series number in tests that were run at Rutgers. It was used successfully by the armed forces and other war services under a wide variety of campaign conditions. It is a slightly viscous, colorless liquid with a mild, witch-hazel-like odor. It is non-irritating to the human skin, and lasts well in storage even under extreme conditions.

Limited amounts of 612 were made available for civilian use late last summer; next season adequate quantities should be ready for general trade distribution.

While some entomologists are seeking chemicals that will drive off insects, others strive to find things that will bring the pests a-flying—to feast on Borgian banquets of poisoned bait or to fall to their death in traps. This has been the task of Dr. George S. Langford and Prof. Ernest S. Cory of the University of Maryland, who reported at the same meeting on success with new attractants for Japanese beetles.

Before the war, the standard Jap beetle attractant was a mixture of eugenol and geraniol—the latter more commonly known as geranium oil. War made these compounds scarce, and new ones had to be sought.

The two Maryland entomologists tried out 100 different mixtures, and found that 40 of them had definite attractions for Japanese beetles. Ten of them ranged from two to three times as effective as the geraniol-eugenol standard. Two compounds, phenyl ethyl butyrate and caproic acid, were found to be exceedingly promising as ingredients for beetle baits. Caproic acid, especially, seems able to give previously used attractants even higher drawing power to beetles roving in the neighborhood.

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SEISMOLOGY

Earthquake on India Coast Strong as Tokyo Quake

➤ THE EARTHQUAKE that caused the disastrous tidal wave along the northwest coast of India was felt by instruments in observatories all over the world; no less than 19 of them transmitted data to the U. S. Coast and Geodetic Survey through Science Service. The observatory of the California Institute of Technology at Pasadena reported that the disturbance on the sea bottom where it centered was at least as severe as the earthquake that wrecked Tokyo and other Japanese cities in 1923.

Seismologists of the U. S. Coast and Geodetic Survey gave out a revised location for the epicenter, which places it a little to the southeast of the spot named previously. (*See SNL* Dec. 8.) The new location is in latitude 22 degrees north, longitude 60 degrees east; this is on the sea bottom near the head of the Arabian Sea, about 300 miles southwest of Karachi, where heavy wave damage was reported. First shock took place on Wednesday, Nov. 28, at 1:56.9 a.m., Karachi time.

Observatories reporting were those of the Jesuit Seismological Association at St. Louis University, Georgetown University, Fordham University, Xavier University (Cincinnati), Spring Hill College near Mobile, Ala., and Weston College, Mass.; of the U. S. Coast and Geodetic Survey at Chicago, Tucson, Ariz., Honolulu, Sitka and College, Alaska, and San Juan, P. R.; the U. S. Reclamation Service at Boulder City, Nev.; the University of Nebraska; Franklin Institute, Philadelphia; the private observatory of Fred Keller, Sr., at New Kensington, Pa.; the Carnegie Institution of Washington at Huancayo, Peru; Riverview College, Sydney, N. S. W., Australia; the Dominion Observatory, Wellington, N. Z.

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The valleys of *Ethiopia* are mostly about 8,000 feet in elevation.

The hemlock looper, ***Ellopia lugubroza,*** devours its weight of hemlock needles in an hour, and does it hour after hour.

NUTRITION

Taking Vitamins in Wine Now Seen as Possibility

➤ SCIENCE is making it easier all the time for you to take your vitamins—soon they may come in wine!

Fortification of wine with B vitamins has proved successful in experiments by Dr. Agnes Fay Morgan, professor of home economics at the University of California.

Dr. Morgan does not recommend that other methods of taking vitamins be abandoned, but she does suggest that fortified wines may be useful as vitamin carriers for medicinal purposes.

The main purpose of Dr. Morgan's research, however, was to counteract the consumption of calories from alcohol, which burns up the body's store of B vitamins.

Chronic wine drinkers, as a result of this burning up of B vitamins, contract an acute alcoholism which is often characterized by dermatitis, mental confusion and the digestive disorders of pellagra. The fortification of wines with B vitamins may help prevent these symptoms.

Vitamins remained stable over a period of four years in the California wines fortified by Dr. Morgan. The experiments were done by Dr. Morgan with the assistance of the California Wine Institute.

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PUBLIC HEALTH

Including Health In Reconversion Plans

➤ IF WE INCLUDE health in our reconversion plans, we have a good chance of raising the state of health throughout the nation to "unprecedentedly high levels." We can increase the average length of life from the present 65 years to 70 years by applying widely the knowledge now available to us, statisticians of the Metropolitan Life Insurance Company point out.

From figures showing the diseases and conditions which take the greatest toll of life, one can learn where the greatest effort must be made, both nationally and by each person anxious to improve his own health.

Leading cause of death for both men and women in the white population of the country in 1942 was chronic diseases of the heart. (The 1942 figures are the latest available for the whole population and are believed to give a fairly accurate picture of the situation today.)

Next cause of death for women was cancer. Among men disease of the heart's arteries and angina pectoris had a slight edge over cancer as a cause of death.

Ranking high as a cause of death were accidents. They "overshadow by a wide margin every other cause of death throughout the greater part of life among white males," the insurance company statisticians point out.

"In the broad age range 1 to 44 years, accidents constitute almost one third of the deaths from all causes among these men; in the decade of life from 15 to 24 years, the proportion is as much as one half.

"Even among girls and young women the loss of life from accidents is large. They account for one fifth of all the deaths among white girls at ages 1 to 4, and for fully one fourth at 5 to 9 years."

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MEDICINE-ENGINEERING

High Speed X-Ray Unit Available for Medicine

➤ A VERY high speed X-ray unit, the millionth-of-a-second Micronex, was the outstanding feature of a two-day demonstration of X-ray equipment now available for peacetime medicine and industry held in Baltimore by Westinghouse Electric Corporation.

Micronex is a unit perfected under war pressure for use in making detailed studies of the protective characteristics of armor plate, the behavior of armor-piercing shells, and similar matters. Operating on the surge generator principle, the unit builds up great reserves of power which are loosed in one instantaneous burst to activate a special tube which generates X-rays capable of penetrating one inch of solid steel in one millionth of a second.

The Micronex will have important uses in future industries, it is predicted. These include studies of cutting tools operating at high speeds, shaft action within a bearing, life and behavior of cutting oils and many others.

Among the units for medical purposes, another X-ray device, called the Monoflex, is probably the most important. It is a deluxe single-tube diagnostic equipment. Also, there is the so-called PFX, a high-speed miniature film unit for chest surveys in combating tuberculosis.

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IN SCIEN

PLANT PATHOLOGY

New Fungus Disease Attacks Cinchona Tree

➤ DISCOVERY of a hitherto unknown fungus disease of the cinchona tree, which has been named cinchona scab, is one of the results of the wartime search made by botanists from the United States for new sources of quinine in South America. It has been identified and is given its first scientific description by Dr. Anna E. Jenkins, mycologist of the U. S. Department of Agriculture (*Journal, Washington Academy of Sciences,* Nov. 15).

The fungus attacks all green parts of the cinchona, making brown spots on leaves and young branches, and causing deformities in the immature seed capsules. It is impossible to judge at present whether the disease does enough harm to be economically important, but it is widespread and has been found on three different species of cinchona trees.

The fungus has been identified as a member of the genus Elsinoe, which contains many species that attack higher plants. It is distinct from all previously known species, however, so that Dr. Jenkins has described it as a new species, giving it the botanical name of *Elsinoe cinchonae.*

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GENERAL SCIENCE

Scientists Urge Aid For Axis Victims

➤ FAMILIES of scientists in Europe, victims of the Axis, are being sent gift packages of food and clothing by a group of wives of American scientists.

The group, made up of wives of scientists at the National Bureau of Standards in Washington, urges any American scientists or individuals interested in augmenting their important work to write to Mrs. E. R. Smith, secretary, at the Bureau for names of needy persons.

Many children as well as adults may be greatly aided during the severe winter expected this year in Europe if help is received promptly. It is suggested that all inquiries state the size of clothing that can be supplied and the countries to which the packages should be sent.

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CE FIELDS

NUTRITION

Speed of "Quick" Freezing Affects Quality Little

➤ VEGETABLES don't really need the ultra-fast freezing stressed by commercial producers, food chemists of the New York State Agricultural Experiment Station at Geneva and the Cornell University School of Nutrition declare, after extensive comparative tests. Texture, color and flavor are little affected by the rate of freezing, they state.

In tests on peas and snap beans, nearly instantaneous freezing was achieved by immersing the vegetables in liquid air. Intermediate rates of freezing were also tested by varying the temperature of the cold room in which the freezing was done.

Vitamin determinations on the frozen beans and peas before and after cooking showed little differences for the different rates of freezing. Several experienced food judges were unable to detect differences in taste and color among lots frozen at different rates.

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ENGINEERING

Compression Distillation For Peacetime Industry

➤ COMPRESSION distillation, a new technique originally developed during the war for getting fresh water out of sea water, promises to become useful in peacetime industry because of its great simplicity and low cost of operation, Allen Latham, Jr., engineer on the staff of Arthur D. Little, Inc., told colleagues at the meeting of the American Society of Mechanical Engineers in New York.

Compression distillation differs from the conventional type of distillation in use for centuries in the way it obtains the heat necessary for evaporating the liquid to be distilled. In the older method, heat was applied continuously to the liquid, and the steam or vapor thus driven off was condensed to liquid again.

In compression distillation, the direct heating-up is only a preliminary step. As soon as a small amount of steam is available it is mechanically raised to a higher pressure. This does two things: raises its temperature as steam, also raises the temperature at which it condenses to water.

This temperature rise of course means that heat is given off, and this heat is used to evaporate more of the water in the still. As long as the pressure is kept up this process is continuous. Fuel or electric power is therefore used to drive the compressor instead of boiling the water in the still.

The compression distillation method described by Mr. Latham was developed by a group of engineers headed by Commodore Robert V. Kleinschmidt for use by the Navy. It was extraordinarily efficient, consuming only one-fifteenth as much fuel for a given quantity of water distilled as was required by the conventional methods. Water produced by the Kleinschmidt stills played an important part in American victories on some of the desolate Pacific islands, especially Iwo, where our forces had plenty of water when the enemy had got into desperate straits from its lack.

Civilian applications of the compression distillation method are being worked out in the Little laboratories, where Commodore Kleinschmidt has now returned to his prewar status as Dr. Kleinschmidt.

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BIOCHEMISTRY

Blood Fractionation Process Patented

➤ A NEWLY ISSUED patent of unusual scientific interest is No. 2,390,074, taken out by Prof. Edwin J. Cohn, Harvard University biochemist. It covers the process he has developed for the separation of blood plasma into its constituent fractions: fibrinogen, globulin, albumin, etc., each of which was demonstrated by wartime medical experience to have its own special therapeutic value.

Separation of these compounds from the mixed solution that is plasma depends on extremely accurate adjustments of their respective acid-alkali balance, the electric charges carried by their molecules, the temperature, and finally the organic precipating agents (alcohol, acetone, dioxane) used to bring them out of solution. Modifications of the process can be used in getting other proteins out of mixed solutions.

Rights in the patent are assigned to the Research Corporation of New York, a non-profit institution which devotes all proceeds from patents which it holds to the promotion of scientific research.

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MINERALOGY

Beautiful New Gem Stone Found in South America

➤ BRAZILIANITE, a new yellowish-green gem stone of unique chemical and crystallographic properties, has just been given its first scientific description by two mineralogists, Edward P. Henderson of the Smithsonian Institution and Dr. Frederick H. Pough of the American Museum of Natural History.

The stone was first obtained by Dr. Pough in Brazil from the owner, who thought it was chrysoberyl. However, examination proved it to be different both in structure and in chemical makeup. Chemically, brazilianite is a hydrous sodium-aluminum phosphate. Its principal drawback is its lack of hardness. That, plus its scarcity, may prevent it from becoming popular as a gem stone.

Brazilianite is the first new mineral with gem-stone possibilities to be discovered since 1909, when the mineral benitoite was found in California.

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AERONAUTICS

Details Revealed of Most Powerful Airplane Engine

➤ DETAILS relative to the most powerful aircraft engine developed and in production anywhere in the world have been released. It is the 28-cylinder, 3650 combat horsepower, Pratt & Whitney Wasp Major, designed particularly for big long-range airplanes. With the war over, production is continuing because it will be the power plant in many giant new airliners.

The 28 cylinders of the Wasp Major are arranged in four rows of seven cylinders each, giving the engine a frontal area no greater than that of the 18 cylinder engine put out by the same company. The new engine is only one inch larger in diameter than the original 410 horsepower Wasp, built in 1925. Excellent cooling characteristics result from a helical arrangement of the cylinders about the crankcase.

The giant engine has deep-finned, forged aluminum cylinder heads and duralumin cylinder muffs of special design; scientifically correct cylinder cooling baffles; the elimination of the conventional ignition harness through the use of seven interchangeable magnetos; and an improved automatically-controlled, hydraulically-driven, variable speed supercharger.

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BOTANY

Your Christmas Tree

Number of needle-like leaves clustered together, shape of cones and how they grow, help identify such Christmas trees as pines, spruces and firs.

By DR. FRANK THONE

➤ CHRISTMAS TREES, this first post-war Yule, will glitter bravely with strange new fruits, we are told: fluorescent lights, plastic baubles, tinted tinsel garlands, and many another novel wonder to make the children's eyes shine brighter. It is well that reconversion has come quickly enough so that some of the things that insatiable Mars has been wolfing for half a decade can already appear, trophy-wise, in the simple home pageantry of the Feast of Peace.

But though the garnish may be new, the trees themselves will be the same as they were in older times. That, too, is well. Christmas is the same feast that has outlived the tyrannies and wars of two long millennia; and if it should see others come, it will, in the end, see them go, too. So it is appropriate that under the symbols of our changing new times we shall still see the abiding symbol of what is beyond the reach of time.

Just because the little trees that suddenly sprout in our homes at Christmastide are old, it would seem natural to assume that they are also familiar. Regrettably, however, that is not the case. We make friends and intimates of them, yet most of us somehow never learn their names.

Easy to Learn

Perhaps this is because we fear the amount of botany involved in learning how to recognize our Christmas tree. There is no reason for such shyness on our part. It is really easy to make friends with our Christmas trees—to learn their first names and some of the more interesting facts about their lives.

You start with their needle-like leaves. Do the leaves on your Christmas tree stand singly, or do two or more of them come from the same spot, their lower ends held together by a common sheath, textured like thin brown tissue paper?

If the leaves are in pairs, or in clusters of from three to five, your tree is a pine. If the number is always five, and the needles dark green and rather soft, it is a white pine. This will not often be the case; little white pines are rarely cut nowadays for Christmas-tree purposes.

If the number of needles is less than five, it will normally be two, though clusters of three or four are frequently found among them. Many pine species have these paired needles. Botanists lump them all together as the yellow-pine group.

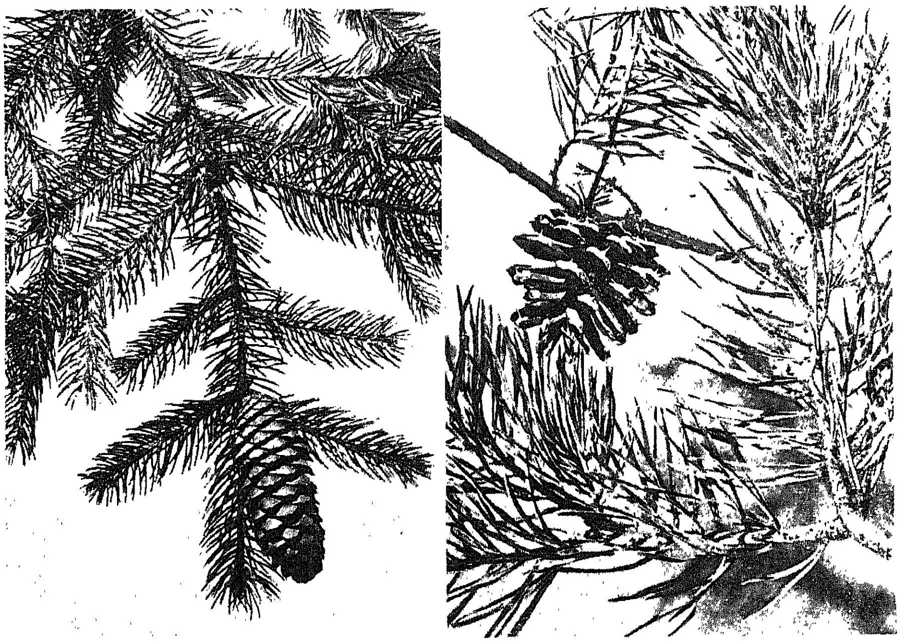
A large proportion of the lower-priced Christmas trees offered in city markets along the entire Atlantic seaboard are saplings of scrub pines that spring up, thick as thistles, on cut-over or burned-over timber lands and abandoned farms. Sometimes they even have cones on them—short, blunt ones, with thick scales.

The other great group of conifers used for Christmas trees have their needles one in a place; another mark that distinguishes them from the pines is their shortness. Pine needles are ordinarily anywhere from two to ten inches long; needles of the trees in this group are usually under an inch.

Three kinds of single-needled trees dominate the Christmas market; spruces, firs and Douglas fir. They are all related, but each has its distinctive features.

Spruces are the most widely offered of Christmas trees, and probably account for the largest over-all total. They are neat, pyramidal little trees, with close-ranked, dark green foliage. Each needle stands out stiffly and has an acute little point, so that if you grab hold of a twig you get a handful of sharp little pin-pricks. If cones are present, they are thin-scaled and hang downward.

Firs are the aristocrats of Christmas-tree society, and usually command higher prices than do the spruces. Their foliage is denser as a rule, and always softer-looking as well as softer to the touch, for the needles have an elliptical cross-section instead of the square or diamond shaped one of spruce needles. They are slightly curved and blunt-ended instead of straight and stiff.



BOTH POPULAR—Widely used as Christmas trees are little spruces, left, easily identified by their singly borne, prickly-stiff needles and down-hanging thin-scaled cones. Small pines, right, also much used, can be told by their longer needles, two or more in a cluster, and their stumpy, thick-scaled cones.

Photographs by Fremont Davis, Science Service staff photographer.

There are likely to be drops or lumps of half-hardened gum on the trunk and branches, whence the tree's other name of balsam. If there are any cones, these will be real beauties; oblong-elliptical in outline, with thin scales pressed closely together, and standing upright on the twigs like fat candles.

While there are several species each of spruces and firs, the Douglas fir stands alone. It isn't really a fir, nor is it really a spruce, though it is sometimes referred to as Douglas spruce.

Douglas fir needles are intermediate between those of spruces and firs: less stiff than spruce and not so flexible as fir; they have points but are not particularly prickly. The tree can be positively identified most easily if there are cones, because between each pair of scales there is a curious, three-pronged appendage that is absolutely unique among conifers.

Douglas fir, strictly a tree of the West, during recent years has also invaded the Yuletide markets as far east as Boston.

In addition to the Big Four among Christmas trees—pine, spruce, fir and Douglas fir—there are a number of other evergreens that are used to some extent as Christmas trees, depending largely on local cutting for local markets. Among these are red cedar (which is really a juniper, not a cedar at all), with its exceedingly small, needle-sharp leaves and berries instead of cones; hemlock, with very short, blunt leaves which it sheds too copiously to be a really desirable indoor companion; and arborvitae or white cedar (again not really a cedar), with its minute, scale-like leaves completely covering its finely branching twigs.

Use Live Trees

One trend that deserves to be encouraged is the growing use of live Christmas trees, with their roots still on them, set in tubs or baskets.

Live Christmas trees are not expensive: John H. Derby, a New York fire-prevention engineer who for some years has been carrying on a successful one-man crusade in favor of their use, states that their cost compares favorably with the prices usually charged for cut Christmas trees of the conventional sort.

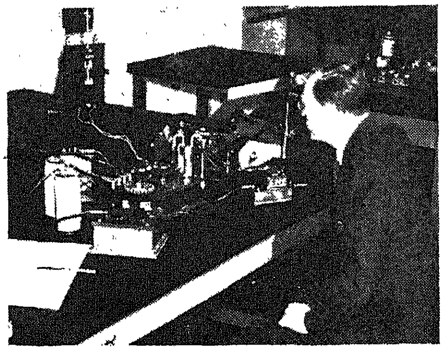
While in use a live Christmas tree is much more attractive than a cut one, because its foliage remains green and glossy, and (what is especially important to the housewife) it doesn't shed nearly so many needles. Moreover, since it does not dry out as long as the roots are kept moderately moist, it never becomes a fire hazard.

At the end of the Yule season, the tree can be taken out and set in a previously prepared pit. When this is done, the burlap that is always wrapped around the earth-ball on the roots should be left in place, and loose earth, mixed with leafmold or well-rotted manure, tamped around it.

The planting should be set about four inches below ground level, to permit copious watering in all but actually freezing weather. A tree winter-planted in this way will usually survive, and will be a lasting memento of your Christmas celebration.

Conservationists used to campaign (albeit ineffectually) against the use of Christmas trees. Now, however, the situation is changed. A large proportion of the Christmas trees that come to market are cut from reforestation plantings, where saplings have to be thinned out, like vegetables in garden rows, so that the rest may have room to grow. Some of the choicer offerings are even raised by nurserymen for the holiday trade, just as poinsettias and Jerusalem cherries are raised.

Christmas wreaths and garlands, though, still present some troublesome



STUDENTS' POTENTIOMETER MEETS MANY LAB NEEDS

Many schools are turning, both for instruction and for routine measurements, to the L&N Students' Potentiometer, shown above in use at one of the large technological institutions. Uses include calibration of meters, temperature measurements with thermocouples, and pH determinations. Because the instrument is similar to the more advanced potentiometers, it provides excellent training for later work.

For further details, request Catalog E-50B (1).

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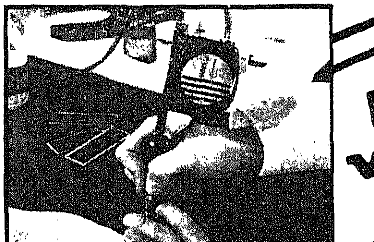

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England imported nearly twice as much *cheese* in 1944 as in 1938.

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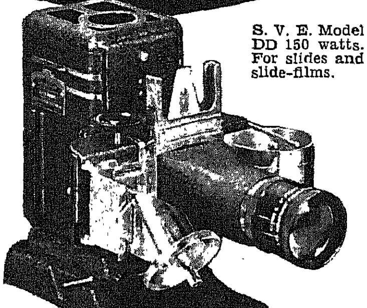
New *phosphorus* compounds have been developed which are of exceptional value in the making of plastics.

A *gorilla* in an English zoo, fed potatoes instead of bananas during the war, did so well that it is doubtful if he will ever get bananas again.

The United States normally consumes about 75,000 *tons* of tin a year, or approximately 45% of the total world output; domestic production is less than 170 tons annually.

Tea-tablets may replace the familiar dried tea leaves; tea can now be reduced to tablets which are cheaper to process and transport than tea in bulk and which make an equally satisfactory beverage as the loose tea.

COMPACT



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problems, from the conservationist's point of view. Native American holly should never be purchased at all. It is practically always collected by wasteful and destructive methods, and usually by persons who do not own the woods where it grows or take the trouble to get the owner's permission. In wide zones around some of our Eastern cities this beautiful small tree has been all but wiped out, and a long closed season is needed to give it a chance to recover.

Where English holly is offered, it is a better buy even though it costs more. It is raised by regular growers, who are honestly entitled to their pay. Moreover, English holly makes a handsomer decoration than the native variety; its leaves are a glossier green and its berries a brighter red.

Science News Letter, December 15, 1945

MEDICINE

"Only Pneumonia"

➤ "YOU won't have to come out, he only has pneumonia," the patient's doctor, a general practitioner, telephoned the consultant he had previously asked to see the sick man he was sending to the hospital.

The consultant in this case was Dr. Roger I. Lee, of Boston, the new president of the American Medical Association. Dr. Lee quoted the conversation at the recent meeting of the Association's house of delegates to illustrate the advances and changes in medicine.

With X-rays to aid in diagnosis and easy-to-give sulfa drugs and penicillin instead of complicated serum treatment, pneumonia is no longer a killer and has become a disease which the general practitioner can treat without aid from special consultants.

This and other advances in medicine are changing the picture of what constitutes adequate medical care, Dr. Lee pointed out.

They must, he believes, be considered as well as the number of doctors and hospitals per 1,000 population in defining adequate medical care with a view to making it available to everyone.

Plasma and whole blood not so long ago were given generally only in well equipped hospitals by physicians. Yesterday they were given on battlefields and landing beaches by hospital corpsmen.

Penicillin makes it easy for the general practitioner to treat syphilis and gonorrhea, whereas formerly he was "a little overwhelmed and dizzy," Dr. Lee believes, by syphilis treatment which required injecting arsenicals into the patient's vein.

Treatment of tuberculosis, on the other hand, "no longer consists in rest, fresh air, milk, eggs and a desire to live" but, Dr. Lee stated, demands the services of specialists in chest surgery, thus removing it from the scope of the general practitioner.

Progress in obstetrics has reached the point where having a baby "ranks with catastrophic illness or an operation as a major inroad on the family budget," Dr. Lee pointed out. He believes that anesthesia, prompt surgical repairs, nursing and all the things that make it necessary to have a baby in the hospital and increase the cost of childbirth are a part of adequate medical care.

Science News Letter, December 15, 1945

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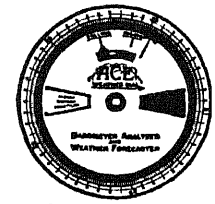

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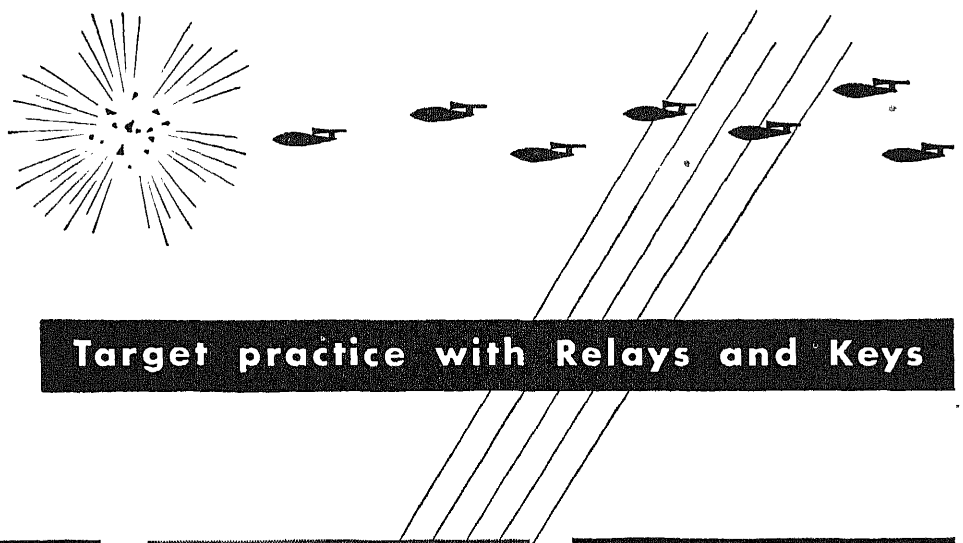

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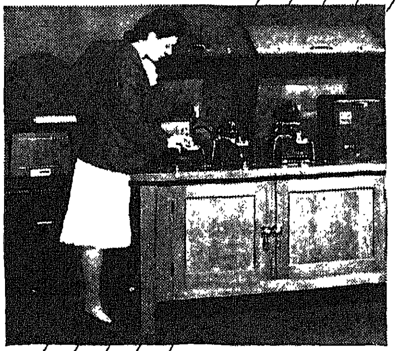

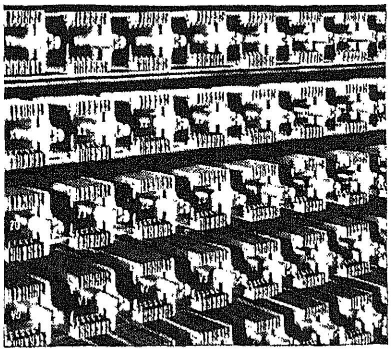

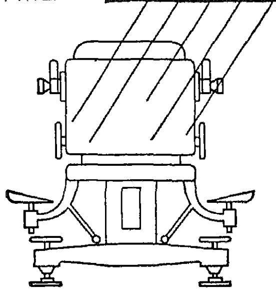

(Left to right) The operator punches the problem data on tape, which is fed into the computer. The solution emerges in the teletype receiver. Relays which figure out the problem look like your dial telephone system.

In designing the gun-control systems which shot down enemy planes, Army ballistic experts were faced by long hours of mathematical calculations.

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In battle action, Electrical Gun Directors are, of course, instantaneous. Such a director helped to make the port of Antwerp available to our troops by directing the guns which shot down more than 90% of the thousands of buzz bombs.

Every day, your Bell System telephone calls are speeded by calculators which use electric currents to do sums. Even now, lessons learned from the relay computer are being applied to the extension of dialing over toll lines.

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Books of the Week

ADULT EDUCATION AFTER THE WAR: A report of an inquiry made for the British Institute of Adult Education—*Oxford University Press,* 64 p. 4/. A study of the present situation in adult education and a plan for its extension by means of changes in methods and organization.

THE ASTRONOMICAL HORIZON—Sir James Jeans—*Oxford,* 23 p., plates, 2/6. A descriptive, non-mathematical statement of the present knowledge in stellar astronomy.

THE AXIS IN DEFEAT: A collection of documents on American policy toward Germany and Japan—Department of State, publication 2433, *Government Printing Office,* 118 p. 30 cents. Contains Atlantic Charter, reports of conferences of the Allied powers, surrender documents, etc.

BIOENERGETICS AND GROWTH: with special reference to the efficiency complex in domestic animals—Samuel Brody—*Reinhold,* illus., charts, diagrams, 1023 p. $8.50. A comparative study of the energetic efficiencies of agricultural processes, such as those concerned in the production of meat, eggs, milk and muscular work.

CIVILIZATION AND GROUP RELATIONSHIPS—a series of addresses and discussions—R. M. MacIver, Ed., *Harper,* 177 p. $2 (Religion and Civilization Series) Members of various minority groups consider the minority problem from the point of view of national welfare and of the effects within the minorities themselves.

DDT FOR INSTITUTIONS—A report on the methods of preparations and use of DDT for insect control. *Research Department, Hospital Bureau of Standards and Supplies, Inc.* 12 p. 50 cents. Complete instructions in the use of DDT. Bibliography.

DIAGNOSIS AND MANAGEMENT OF PERIPHERAL NERVE INJURIES—Robert A. Groff—*Lippincott,* 188 p., illus., $8. A practical working guide with specific advice on how to recognize and manage injuries affecting the peripheral nerves, with an illustrated outline of peripheral and cranial nerve function.

DR. W. C. ROENTGEN—Otto Glasser—*Thomas,* 169 p., illus., $4.50. A commemorative volume for the 100th anniversary of the birth of the discoverer of the X-ray, containing a new translation of the three classic papers on "A New Kind of Rays."

THE EFFECT OF SMALLPOX ON THE DESTINY OF THE AMER-INDIAN—E. Wagner Stearn and Allen E. Stearn—*Bruce Humphries,* 153 p., tables, $2.50. A compact history of smallpox among the American Indians from the 16th to the 20th century.

FISHES AND SHELLS OF THE PACIFIC WORLD—John T. Nichols and Paul Bartsch—*Macmillan,* 201 p., illus. and plates, $2.50. Complete descriptions of the appearance and habits of the fishes and shells of the Pacific which are most easily identified and most widely distributed.

GENERAL BIOLOGY AND PHILOSOPHY OF ORGANISM—Ralph S. Lillie—*University of Chicago Press,* 215 p., $3. A theoretical biology essentially concerned with the interrelationships of the psychical and the physical as these things manifest themselves in all living things.

INTERNATIONAL RELATIONS IN SCIENCE: A review of their aims and methods in the past and in the future—Walter B. Cannon and Richard M. Field—*Chronica Botanica,* 46 p., free. Memorandum prepared for the Division of Foreign Relations of the National Research Council. An investigation of the opinions of scientists on the aims, scope, and possibilities of international relations in science.

OCEANIA: Hawaii, New Zealand and the South Pacific—Charles A. Borden—*Holiday House,* 25 p., illus., $1. An informal presentation for tomorrow's citizens of the role these islands have played from the time of the Polynesian colonizers to the aircraft carriers of Task Force 58.

THE PERSON IN THE BODY: An Introduction to Psychosomatic Medicine—Leland E. Hinsie—*Norton,* 263 p., $2.75. An introduction for the general reader to the study of the relationship between emotions and bodily ills.

THE PHYSICIAN'S BUSINESS: Practical and economic aspects of medicine, 2nd ed.—George D. Wolf—*Lippincott,* illus., 433 p., $6. Solves the problems of the practitioner; shows how to efficiently and effectively systematize work to be done.

THE ROMANCE OF HUMAN ARCHITECTURE—Maurice Chideckel—*Bruce Humphries,* 107 p., $2. A brief and lucid description of the nature and function of all the organs of the human body.

THE SCIENTIST AND LOCAL GOVERNMENT—F. Le Gros Clark, Association of Scientific Workers, London—*Temple Fortune Press,* 12 p., 3d. An exposition of the organization and function of local government in England and Wales.

THIS EARTH ONE COUNTRY—Emeric Sala—*Bruce Humphries,* 185 p.. $2.50. A political, economic and religious solution to the problems of world peace and international ethics. Based on the Bahá'í faith.

TREES, SHRUBS AND VINES FOR THE NORTHEASTERN UNITED STATES—George Graves—*Oxford,* 267 p., illus., $3. Suggestions for culture, propagation, and pruning of a selective list of trees, shrubs, and vines suitable for the area by the as-

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TRIAL OF WAR CRIMINALS—*Superintendent of Documents*, 89 p., 20 cents. Contains the Report of Robert H. Jackson to the President, the agreement establishing an international military tribunal and the indictment, plus appendices on the responsibility of individuals and special groups.

TROUBLE ZONE—Leon Dennen—*Ziff-Davis*, 173 p., $1.50. Firsthand report on the Balkans and the countries of the Eastern Mediterranean where the author sees the stage for a vast conflict between England and Russia, concluding that only democratic federations will bring peace to these small countries.

TURKEY—Vernon Ives—*Holiday House*, 25 p., illus., $1. The story of the rebirth of Turkey into a modern Western democracy, showing how the country developed and what its people hope to do.

THIS WAY TO UNITY—Arnold Herrick and Herbert Askwith, Editors—*Oxford Book Co.*, 462 p., $1.50. A collection of sketches and essays aimed at promoting goodwill among racial and religious groups. For use in English classes as a basic literature textbook.

WOOD PRODUCTS FOR FERTILIZER—Report of conference at Orono, Maine, June 29, 1945, *Northeastern Wood Utilization Council*. Bulletin 7, 72 p., charts and tables, $1. Discussions and papers on problems of fertilization. Appendix includes description of new ammonia process for sulphite pulp.

WORLD ORDER: ITS INTELLECTUAL AND CULTURAL FOUNDATIONS—F. Ernest Johnson, Ed.—*Harper*, 247 p., $2. A series of addresses by Margaret Mead, Harold Lasswell and David Levy as well as other leaders in intellectual life.

Science News Letter, December 15, 1945

SAFETY

Freak Accidents

➤ THE SAD CASE of a hunter who shot himself in the knee when his arm was jarred by a duck, causing his trusty automatic pistol to go off, is listed by the National Safety Council in its 1945 round-up of freak accidents.

It's odd enough, perhaps, when a fire starts itself and then puts itself out, but when it happens twice in the same way, you begin to wonder. During the past year in both New York and Maine the sun's rays, passing through a bottle of water in a truck, set fire to the floor of each truck. But the heat of the fire broke the bottle and the water put out the flames.

When a pin in her washing machine broke off, Mrs. Fixit of Minnesota looked around for a substitute. Sawing off the end of something of appropriate size she found around the house, she started to hammer it into the machine. But the substitute pin exploded and blew her across the room—she had selected a stick of dynamite.

A Californian was repairing a wall one day when a concrete block fell from a fourth-story scaffold and hit him on the head. Reeling into the street, he was struck down by a policeman's motorcycle. He recovered satisfactorily from both accidents.

A cab in Saskatchewan skidded into a lamp post one night last January when the thermometer hovered around 16 degrees below zero. The driver was knocked unconscious and might have frozen to death if a fire alarm box on the lamp post hadn't been set off by the crash, bringing firemen to the rescue.

Doctors and economists both might well be puzzled by the case of the 17-month-old in Pennsylvania who swallowed a nickel and coughed up a penny.

Science News Letter, December 15, 1945

Much *onion seed* used in the United States is grown in the Canary Islands.

DDT insecticide preparations, now available on the market, should be used as directed on the package so that they will do no unwanted harm.

The *axolotl*, a salamander having external gills and living its entire life in water, if fed thyroid loses its gills and becomes a land salamander, going to water only to lay its eggs.

Dietary Protein after Surgery and Other Trauma

apparently must be maintained at a level above normal in order to assure proper wound healing* and at least average resistance to infection. The feeding of meat, therefore, in adequate amounts, as soon as it can be instituted, appears doubly advantageous: The protein content of meat is high and of highest biologic value; the human digestive tract appears well adapted for handling meat protein.****

*Hoff, H. E.: Physiology, New England J. of Med. 231:492 (Oct. 5) 1944.

**Crandall, L. A., Jr.: The Clinical Significance of the Plasma Proteins, Memphis M. J. XIX:147 (Oct.) 1944.

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Science News Letter, December 15, 1945

⚙ *ELECTRIC razor, pencil-shaped, has its cutting face in the sides of the cone-shaped end. The rotating cutting blade is kept in contact with the perforated sloping point by centrifugal force and not only cuts the hair but blows away the cuttings.*

Science News Letter, December 15, 1945

⚙ *FLASHLIGHT, without the familiar glass lens, has a transparent plastic casing with a dome-shaped end. A round section of the center of the dome-shaped end is cast lens-shaped. Being an integral part of the casing it is difficult to break.*

Science News Letter, December 15, 1945

⚙ *FOLDING flatiron for the convenience of travelers has a handle that may be closed down to the thin base when packed or opened upward when in use. The handle is hinged at its rear and is unsupported at its front. A locking device holds it in position.*

Science News Letter, December 15, 1945

⚙ *PLASTIC SKIN, applied to metal machine parts to protect them from corrosion in the tropics, contains fiberglas because this fiber gives strength and transmits a minimum amount of moisture. To remove, the plastic is slit with a knife and stripped off as illustrated in the picture.*

Science News Letter, December 15, 1945

⚙ *TRAFFIC SIGNAL, to be attached to the rear window of an automobile, consists of two windshield wiper motors electrically controlled by the driver. The wiper arm of either can be raised at will; one has an arrow pointing to the right, the other a similar arrow pointing to the left.*

Science News Letter, December 15, 1945

⚙ *SCISSORS sharpener is a simple implement for home use. It consists of a stand to hold the blade of the shears so that the sloping surface of the cutting edge is parallel to the base of the device. The file used for sharpening has a short support on its handle which keeps it in proper position as the knob slides on the base.*

Science News Letter, December 15, 1945

⚙ *VISUAL education device is attached to the head in front of the eyes and contains picture film that can be viewed in stereoscopic relief. By glancing downward, the wearer has a clear view of his desk. Both of his hands are free for drawing or other work.*

Science News Letter, December 15, 1945

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Question Box

BIOCHEMISTRY

What is the procedure in the new blood fractionation process? p. 377.

What is the newest antibiotic? p. 371.

BOTANY

How can you identify spruce Christmas trees? p. 378.

ELECTRONICS

How can storms be located within a 2,000 mile radius? p. 372.

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What is 612? p. 375.

MEDICINE

What is the latest hope for hayfever sufferers? p. 371.

MEDICINE-PHYSICS

How will treatment of deep-seated internal cancers be improved? p. 373.

MINERALOGY

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NUTRITION

How much effect does the rate of freezing have on the texture and flavor of vegetables? p. 377.

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What was the "ghost army"? p. 374.

PLANT PATHOLOGY

What is cinchona scab? p. 376.

PUBLIC HEALTH

Why should health be included in our reconversion program? p. 376.

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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • DECEMBER 22, 1945

28 FEB 1946

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See Page 394

A SCIENCE SERVICE PUBLICATION

GENERAL SCIENCE

Rush of Scientific Ideas

Many discoveries, dammed up in researchers' minds as they toiled at wartime tasks, expected by Dr. Vannevar Bush, Carnegie Institution President.

➤ SCIENTIFIC discoveries can be expected to take a big spurt ahead in the next few years, if the world remains at peace and the country continues prosperous, Dr. Vannevar Bush, president of the Carnegie Institution of Washington, predicted in his annual report.

Several factors figure in this expected upswing in research, Dr. Bush stated. To one, he gave final emphasis:

"Many a scientist has now applied himself assiduously for five years to tasks often far from his inclinations, assigned by the needs of the moment, and requiring his full energies. Yet the speculative mind has not been idle, even though it has been temporarily inhibited from entering those inviting trails that have been glimpsed in the midst of harassing and confining duties. Every brilliant scientist in the country's service probably has one or more of these which he has promised himself he would pursue when the release came, and it has now come. We have had a partial moratorium on the creations of fundamental science, we have unwisely produced a deficit of scientific manpower, but we undoubtedly have a new stock of dammed-up ideas. It will be interesting to watch what happens as the dam breaks."

As wartime chairman of the Office of Scientific Research and Development, Dr. Bush had to watch the demands of war pull the best research men out of the laboratories, not only of his own institution but of all the universities and research establishments of the country. He again called attention to sins committed against the scientific welfare of this country by the indiscriminate shoveling of the best scientific brains into pick-and-shovel and potato-peeling tasks:

"By taking altogether too many trained young scientists and engineers out of the laboratories and industry, we very nearly wrecked that part of our war effort which consists in keeping the instrumentalities in the hands of our fighting men substantially superior to those of the enemy. We also sacrificed the future to immediate needs, more than did any of our allies or indeed our enemies, by halting our processes of advanced education, thus creating a lack of scientific manpower from which we shall not recover for many years. We are a strange country. As this is written we are at peace, but we are still doing both these things."

Finally, Dr. Bush adverted to recently expressed misgivings lest the great emphasis of science bring about a state of educational unbalance in this country. The right remedy, he declared, is not to slow down science but to widen opportunities in all the arts and professions—including the improvement of the education of future politicians who will govern our democracy.

"Specifically," he said, "we need to educate fully in this country all the brilliant young minds that can be found, wherever they may be located and whatever their station. We have never done so nearly well enough."

Antibiotic Structure

➤ GERM-STOPPING substances with penicillin-like action formed by green plants apparently belong to the well-known group of organic compounds chemically classified as unsaturated fatty acids, Dr. H. A. Spoehr and his associates state in the new Yearbook of the Carnegie Institution of Washington. Commonest use of fatty acids is in the making of soap.

Scientists in Dr. Spoehr's laboratory discovered, a year or so ago, that a one-celled green water plant known as Chlorella, secreted a germ-stopping substance, or antibiotic, into the water. They gave this substance the name of chlorellin. To get it in a more concentrated form in less time, they tried grinding up dried masses of Chlorella and extracting them. What came out was a dark, oily material which had no particular germ-stopping power but which acquired it upon exposure to air and sunlight.

This oily stuff was identified as a fatty acid of the unsaturated series, that is, one still capable of taking in more oxygen. When more familiar unsaturated fatty acids such as lauric and linoleic were tried out they produced similar results: no action when freshly prepared, but germ-stopping effects after exposure to air and sunlight. Similarly, extracts made from leaves of a wide variety of green plants behaved like the chlorellin preparations.

Dr. Spoehr suggests that mankind has been for ages unconsciously giving itself some protection against germs through the antibiotic action of the green plants in most diets.

Hybrid Grass for Pastures

➤ HYBRID CORN in the fields may soon be waving its greetings to a newcomer: hybrid grass in the pastures. Breeding experiments of Carnegie Institution plant scientists under the direction of Dr. Jens Clausen are producing crosses between widely different species of bluegrass that promise to thrive under climatic and soil conditions forbidding to both parents. One such hybrid, between a giant bluegrass from the prairies of eastern Washington and a hardy race of Kentucky bluegrass from Swedish Lapland, combines a bunch-grass growing habit with the production of stolons or runners, and a summer-active, winter-dormant way of life with its exact opposite, the tendency to grow in winter and lie dormant in summer. Out of such combinations of opposites it is hoped to produce more vigorous, more nutritious grass varieties for the range.

How Volcanoes Make Fossils

➤VOLCANOES have apparently always been prime makers of plant fossils; at least, such fossils are always especially abundant in deposits of volcanic ash. Studies of the process at its beginning have been made possible by the opportune birth of the young volcano Paricutin in Mexico; Dr. Ralph W. Chaney, leader of the Institution's work in paleobotany, reports on findings made in the region by Dr. Erling Dorf.

Fossil formation is a slow job, and little or no change can be seen yet in the leaves, stems and fruits buried by Paricutin's ash showers. Apparently the relative abundance of fossils does not necessarily give a true picture of the original state of the vegetation, for Dr. Dorf has found relatively few alder, linden and cherry remains, though these trees are plentiful in the neighborhood; buried pine and oak remains are more abundant. There seem to be better chances for plant parts to survive as fossils if they are buried in dry ash than if the ash falls on

(Turn to page 388)

PHYSICS

Man-Made Cosmic Rays

4,000-ton cyclotron may permit their artificial production, the obtaining of atomic energy from cheaper sources and the discovery of many new elements.

➤ BREAKING the war-imposed silence which has shrouded atomic research since 1941, Prof. Ernest O. Lawrence, University of California physicist and Nobel Prizewinner, disclosed that work has been commenced on a $1,450,000 project which will provide the university with a gigantic 4,000-ton cyclotron, three times larger than any now available, for use in peacetime atomic exploration. The machine, which will be completed next summer, may for the first time permit the artificial production of cosmic rays, the obtaining of atomic energy from cheaper sources than uranium, and the discovery of many new elements, Dr. Lawrence predicted.

The youthful-appearing scientist was frankly elated as he announced that military authorities had flashed a green light to "go ahead with unhampered peacetime atomic research."

"Certain security restrictions will continue in effect," he said, "but I believe we shall be able fully to publicize our activities in the very near future."

For the present, though, Dr. Lawrence added, American researchers must confine their experiments to this country, not exchanging findings or data with scientists of other nations.

"I find no fault with these security restrictions," he emphasized.

Construction of the 4,000-ton cyclotron began in 1940, Dr. Lawrence continued, but was halted two years later to permit use of the equipment already installed for production of the first sizable portions of U-235 pure enough for use in the atomic bomb.

When completed the giant atom-smasher will be five times more powerful than the present 60-inch Berkeley cyclotron, which was also a top-secret wartime project when it was employed in research on the bombs that leveled Nagasaki and Hiroshima. The new 184-inch cyclotron was originally designed to produce deuterons (heavy hydrogen nuclei) of 100,000,000 electron volts, Dr. Lawrence said, but knowledge gained in war research has resulted in plan changes which will permit physicists to accelerate deuterons to energies of 200,000,000 electron volts and alpha particles (helium nuclei) and protons (hydrogen nuclei) to energies of 400,000,000 electron volts. However, he added, the machine, which includes a 3,700-ton electromagnet—the largest known to exist—will initially be capable of producing deuterons with energies of 60,000,000 electron volts and alpha particles of 120,000,000 electron volts. These are merely words to the average layman but to Dr. Lawrence and his associates they spell the opening of broad new fields for research from which radical changes affecting all human life may develop.

"The enormous energies which will be achieved will make practical the heretofore impossible testing of many theories of atomic structure," Dr. Lawrence stated. "Nobody knows what the ultimate results will be, but this laboratory will be open 24 hours a day, seven days a week, constantly pressing the quest for new knowledge."

Operation of the giant atom smasher, he declared, will bring science into a "new realm of the atom."

"We shall be breaking through a new barrier," he said. "What we find beyond should be as exciting as what we have found since the 1930's, when we began breaking into the nucleus of the atom. That we shall learn more of the elementary forces of nature is almost certain. The opportunity will exist for mankind to gain greater control of our environment through the use of this information."

The research machine will provide new tools for research in biology, medicine, chemistry and agriculture, Dr. Lawrence pointed out.

Prof. Wendell M. Latimer, Dean of the University of California college of chemistry, and Prof. Glenn T. Seaborg, one of the discoverers of plutonium, said they hoped it will be immediately possible to use the device to produce new trans-uranic elements, four of which have been obtained by combined processes of bombardment in the 60-inch cyclotron and chemical separation.

The promised artificial production of cosmic rays is significant, Dr. Lawrence pointed out, because scientists presently pin their hopes of eventually understand-

LONDON CONFERENCE—U. S. delegation at the UNESCO Conference, (See SNL, Dec. 1), included: first row, right to left: Senator James Murray, Archibald MacLeish, Chester E. Merrow, Dean Mildred Thompson; second row, right to left: Dr. Warren Kelchner, Dr. Bryn J. Hovde, Dr. Harlow Shapley, Dr. Grayson N. Kefauver; next row: Kenneth Holland, Charles Thomson.

Linlithgow Library.
Imperial Agricultural Research Institute,
New Delhi.

ing the nature of matter on these rays.

Cosmic rays, he added, are believed to result from explosions in nature releasing atomic energy. Laboratory production of them will permit a constant study, he explained, as contrasted with the present limitation which permits study of chance cosmic rays only as they pass through instruments such as cloud chambers.

"Such fundamental research is necessary if we are to understand the forces with which we are working," Dr. Lawrence declared. "While we know how to produce the atomic energy in a bomb, we know very little about the elementary nuclear forces involved in the release of atomic energy."

Science News Letter, December 22, 1945

MEDICINE

Unbearable Pain Relieved

Brain operation removes fear and worry and thus remedies the pain of cancer, spinal nerve root inflammation and tabes dorsalis.

➤ UNBEARABLE pain in cancer and in spinal nerve root inflammation, and the girdle and lightning pains of tabes dorsalis, have been relieved by a brain-cutting operation, Dr. James W. Watts and Dr. Walter Freeman reported at the meeting of the United States Chapter of the International College of Surgeons in Washington, D. C.

Prefrontal lobotomy is the technical name for the surgical procedure. The brain is cut but no part of it is removed. The operation was first devised for certain types of mental and nervous illness. Connections between the frontal lobes and other parts of the brain are severed by this operation and thereafter anxiety, worry and nervous tension are relieved.

With the banishing of fear and worry by the operation, patients who had been complaining unceasingly of pain stopped complaining. They no longer asked for morphine and appeared comfortable and in good spirits. When asked about the pain, however, some admitted it was still present and exactly like it was before the operation.

The operation, the surgeons concluded, changes the patient's reaction to pain without materially changing his ability to feel pain. Among those with unbearable pain before the operation, even in cases of cancer, the fear of pain and worry over it seemed to be quite as important as the pain itself.

The discovery that the operation would affect unbearable pain was made in experiences with some of the 360 patients for whom it was performed for nervous and mental diseases. Following this, it was tried in other patients without mental or nervous disease. The results were equally successful.

"It goes without saying," the surgeons stated, "that an individual who bears his pain with fortitude is not a candidate for psychosurgery. But when the pain becomes unbearable and when fear of pain becomes as important as pain itself, then lobotomy has something to offer."

Science News Letter, December 22, 1945

MEDICINE

Disease Treatments Sought In Herbs of Central Asia

➤ NEW treatments for disease are hoped for through use of plants and herbs expected to be discovered by a Soviet medical expedition in the mountainous Altai region of central Asia.

The sending of several expeditions to this area has been announced by the U. S. S. R. Academy of Medical Sciences through its secretary, Prof. V. V. Parin.

Other inquiries under way include a survey of the health conditions in the regions that were occupied. In all, 30 medical expeditions are now in the field.

Science News Letter, December 22, 1945

From Page 386

matted wet accumulations in ponds and streams. The most likely place for Paricutin's plant burials to become fossils is in the valley ash covered by lava flows.

Field Work Resumed

➤ FURTHER digging into America's remote past has already been started, now that the war is at an end, Dr. A. V. Kidder reports. More ambitious projects will be undertaken in the coming year. One place where work will be actively pushed is in Guatemala, where preliminary surveys have already discovered ruins that appear to date from late prehistoric times, Dr. Kidder said.

A Mexican draftsman of mixed Spanish and Maya descent, Isaac Esquiliano, of Merida, is working under the direction of Dr. S. G. Morley on a dictionary of the still-unsolved hieroglyphic writing of the ancient Maya people. Although the glyphs cannot yet be read, their general subjects can be identified, and a classification is thus possible. This in turn is expect to aid in the classification of new glyphs as they are discovered, as well as in the more accurate identification of partially destroyed inscriptions.

Science News Letter, December 22, 1945

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GENERAL SCIENCE

Atomic Power Leads

Science Review for 1945 shows the atomic bomb, radar, proximity fuze, and influenza vaccine have top billing among the year's advancements.

This summary of the year's happenings in the world of science is limited by space to just the highlights. Most of the events are described in detail in the pages of the SCIENCE NEWS LETTER *for the current year. If you wish to refer to any particular report you may find it readily through the index. (See SNL, June 30 and also the issue which will appear next week, Dec. 29).*

By SCIENCE SERVICE STAFF

➤ ENERGY from within the atom used in the atomic bomb is the most important advance in science announced in 1945 with world-shaking consequences. Possibility that atomic bombs will aid the elimination of future wars or make the next world conflict a danger to civilization's continuance has projected science into first place in international affairs.

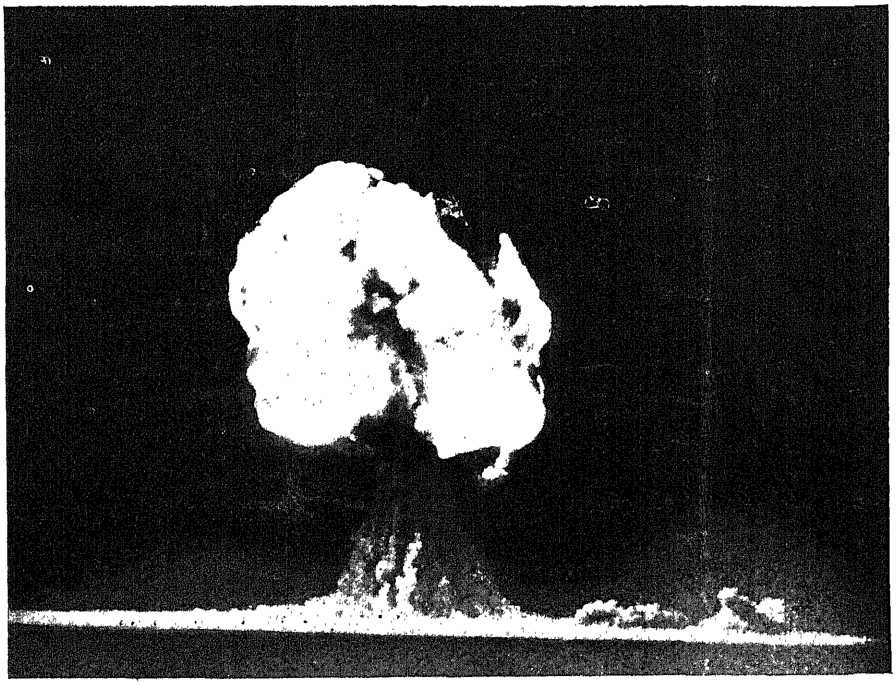
Science summaries for 1940, 1941, 1942, 1943 and 1944 need additions due to advances kept secret. Achievement of the first cyclic nuclear reaction in 1942 ranks with the discovery of fire. Four new chemical elements have been added to the 92 previously known and one of these, 94, or plutonium, is the material most effectively used in the atomic bomb.

No less important are the by-products of nuclear fission, including the large variety of radioactive products not completely revealed that promise major medical treatments and explorations of cancer and other diseases and the industrial use of chemical production methods developed in the $2,000,000,000 atomic bomb project.

War applications of electronics, including radar, the proximity fuze using radar principle, loran which is a radio navigation system, perfected radio communication methods, and other developments were announced with the promise of many peacetime uses.

Among the health advances were several treatments for diseases unconquered, use of influenza vaccine on a large scale, an antidote for arsenic and bichloride of mercury, two promising rat poisons and continued applications of DDT.

First legislative steps were taken toward a federally supported national research foundation.



ATOMIC TEST—Light in the atomic test explosion in New Mexico gave way to the huge fiery ball of vapor which is shown boiling skyward above a pillar of dust in this U. S. Army Air Forces photograph.

ATOMIC POWER

Dropping of Atomic Bomb Announced on Aug. 6

➤ DROPPING of an atomic bomb on Hiroshima, Japan, was announced by President Truman on Aug. 6. A second bomb of the same character was dropped on Nagasaki on Aug. 8.

The War Department released on Aug. 10 a semi-technical report on the processes by which the use of atomic energy for military purposes had been achieved. It was written by Dr. H. D. Smyth of Princeton at the request of Maj. Gen. L. R. Groves, U. S. Army, head of the "Manhattan Project," which was the Army's designation of the atomic bomb project.

Reports by the British and Canadian governments on their share in developing the atomic power project were released simultaneously with the Smyth Report.

The Smyth Report revealed the following steps in the development of the atomic bomb—these steps had previously been withheld from publication by a voluntary secrecy agreement set up by the scientists working on the problem:

Possibility of using the large amounts of energy released by nuclear fission for production of a bomb began in 1939 with confirmation of the announcement of fission of uranium—European-born physicists were instrumental in getting U. S. Government support for this project. Scientists voluntarily restricted publication of papers on the subject of uranium fission in scientific journals.

Fission of uranium isotope of atomic weight 235 was the only likely source of atomic power at the time the U. S. Government took up the atomic power project.

Research on U 235 fission, using heavy water (D_2O) as the moderator, was under way in both England and Germany in 1939. American scientists substituted specially purified graphite for heavy water.

In order to make the fission self-sustaining, it was found necessary to separate U 235 (less than ½% in any uranium sample) from the more abundant isotope U 238 (more than 99%). The more common kind prevents the chain reaction by absorbing neutrons.

An enormous isotope separation plant, using gaseous diffusion methods, was erected at Oak Ridge, Tenn., where much of the experimental work for the whole project was done.

Formation of element 94 from uranium 238 by neutron capture was effected in the Radiation Laboratory of the University of California in 1941. The new element was found to undergo slow neutron fission like uranium 235. It was named plutonium.

Plutonium (Pu), element 94, radioactive but approximately as stable as radium, was obtained from uranium 238, element 92, by way of the intermediate short-lived element 93, named neptunium (Np). At least two isotopes of each of the new elements, 93 Np 238, 93 Np 239, 94 Pu 238, 94 Pu 239, are known. Uranium 238 changes to neptunium and neptunium to plutonium by beta-ray transformation. Plutonium emits an alpha ray and slowly changes back into U 235.

Manufacture of plutonium from U 238 allowed utilization of the inert uranium isotope for atomic power purposes. It allowed the advantage of sharp chemical separation of different elements instead of the tedious diffusion methods of isotope separation.

On Dec. 2, 1942, the first selfsustaining nuclear chain reaction ever initiated by human beings began at West Stands pile, Stagg Field Stadium, Chicago.

The organization of the atomic bomb project was at first under OSRD. During 1942 and the spring of 1943, control was gradually shifted to the Army, and in May 1943 the Army Engineer Corps took over.

Production of materials for atomic bombs was at first planned to be located at the Clinton Engineer Works at Oak Ridge in the Tennessee Valley. Later the plant for full scale manufacture of plutonium was built at Hanford, Wash., and the bomb laboratory was located at Los Alamos, N. M.

July, 1945, the date of completion of the Smyth Report, found the scientists who had worked on the project prepared for the first use of the atomic bomb as a weapon and looking ahead to the possible peacetime uses of nuclear power and the social consequences of the terrible weapon they had evoked.

International implications of the atomic bomb became apparent when various proposals were considered by Congress and the atom bomb became a growing factor in relations with other nations.

AERONAUTICS

Jet-Propelled P-80 Goes 550 Miles Per Hour

➤ JET-PROPELLED P-80 or "Shooting Star," with a speed of over 550 miles per hour and able to cruise at 45,000 feet, was designed with a new type of wing with a knife-like leading edge.

The Army's giant B-32 bomber, equipped with eight turbo-superchargers and weighing 50 tons, was designed to fly at more than 300 miles per hour.

Rapid climbing ability was one of the special features of the new Navy Corsair, fighter-bomber, with a speed of 425 miles per hour.

A new type of airplane, the Navy "Fireball," was equipped with two engines which can be operated together or separately, one of which is a reciprocating engine driving conventional propellers and the other a jet propulsion engine.

An adaptation of the "Lightning," P-38 fighter, was especially designed for carrying cargo.

The "Packet," heavy cargo plane, was produced with 22,000-pound useful load capacity; it has a nearly square fuselage and in effect is a large flying truck or freight car that can be loaded through tail doors.

"Seahawk," Navy's observation-scout plane, was made to fly higher, farther and twice as fast as any previous models.

A 10-passenger or cargo helicopter with two rotors in tandem, mounted at the front and rear on the fuselage, successfully passed tests in the air.

A commercial transport, the 202, accommodating 30 passengers, was designed to fly 250 miles per hour, faster than any prewar twin-engined airliner.

A giant Clipper was designed to carry 204 passengers and 14,000 pounds of cargo, at a speed of 340 miles per hour, which would mean New York to London in ten hours.

A glider capable of carrying 16 men and two tons of freight, 500 pounds more than previous models, was developed with reinforced nose section that opens like a mouth, and short wings.

A 8,198-mile non-stop, non-refueling flight was made by a Superfortress that flew from Guam to Washington, D. C., in 35 hours, 5 minutes.

Radar equipment, permitting operators on the ground to see on a radarscope the actual position of all aircraft within a 25-mile radius, enabled them to direct pilots to safe landings in heavy fog or overcast.

A small detector attached to the carburetor was devised to warn pilots of impending engine trouble by showing changes in horsepower output.

A compact turbosupercharger, that muffles engine noises and makes possible increased speed of planes, was invented.

An electronic control stick that requires only one hand made it possible for one-armed drivers to fly heavy four-engine bombers.

An experimental plane without rudders, ailerons or elevators, in which the whole wing is controllable, was developed to increase safety and ease of handling of personal planes.

A portable plane-handling apparatus, consisting of steel cables and nylon rope loops, provided a braking system for light planes and permitted them to land and take off without landing runway or field.

A direct fuel injection system for air-cooled engines was developed that reduces fuel consumption and makes possible increased rate of climb and acceleration.

A new instrument approach control technique using VHF, very high frequency radio waves, allowed safe landing of planes through overcast at three-minute intervals.

Radiant heating was introduced into airliners, using heated air between the inner and outer walls.

An international air freight service was inaugurated.

A variable-density wind tunnel, capable of simulating flight conditions within speed-of-sound range, made it possible to test jet-propelled airplane models with wingspans up to 10 feet at pressures comparable to 35,000-foot altitude.

An acetylene-burning beacon light, visible at 12 miles, was developed that will burn for a year without adjustment or refueling; it is turned on and off by the sun.

Ultra-high radio frequency was used to operate from the ground pilotless, model airplanes used as antiaircraft targets for gunnery practice.

ANTHROPOLOGY-ARCHAEOLOGY

New Find Is Identical With Famous Wadjak Skull

➤ A TOMB of the late first century A. D., found between Jerusalem and Bethlehem, yielded inscriptions which may have been written by followers of Jesus.

A human skull discovered near Keilor, Australia, was shown to be identical with the famous Wadjak skull, believed to be 20,000 years old.

Restudy of the ancient child's skull found in 1938 in Uzbekistan, Central Asia, led to the belief that it is not a Neanderthal of the classic European type, but a more advanced human type.

The Plesianthropus, or "almost man" skull from Africa, was found to be more man-like than preliminary studies showed.

Measurements of the faces of 3,000 soldiers were made under the direction of anthropologists with a new instrument making simultaneous measurements of 62 facial characteristics; ten different head types were established.

An expedition into interior Chiapas, Mexico, made additional findings of gigantic images of human heads, as well as caves stacked with ceremonial pottery.

Arrangements were made to move 20 giant prehistoric statues for exhibition in Mexico City from an inaccessible region of Tabasco.

By studying the twists in human leg bones, anthropologists obtained knowledge useful in correcting bad foot posture.

Shells of giant ostrich and dinosaur eggs show the same X-ray diffraction patterns of calcite as lobster claw and modern hen's egg.

A well-preserved corpse, buried in frozen soil 180 to 200 years ago near Yakutsk in northern Siberia, was reported found, surrounded by numerous personal objects, including butter, porridge and sour cream.

The first simultaneous census of all the countries of the Western Hemisphere was planned for 1950.

Rare example of Arabic block print on parchment, probably from the 14th century, was identified in an old collection of papyri in the United States.

Oldest recognized culture in the eastern United States, the Archaic, was more clearly defined in the description of a site on Frontenac Island, Cayuga Lake, N. Y.

Analysis of findings in Kentucky mounds showed that the Adena people differed physically from the Hopewellians and were culturally more primitive.

Studies of fossil pollen under way in Australia promise to throw light on the cause of variation in coal and on conditions of coal formation.

ASTRONOMY

Total Eclipse of Sun Occurred on July 9

➤ TOTAL eclipse of the sun on July 9 was studied by astronomers in Montana, Canada, Norway, Sweden and the USSR; the eclipse was precisely timed in many parts of its path and cause of polar rays of the sun and the phenomenon of the "falling shadow" studied.

A supernova or brilliant exploding star

100 million times as bright as the sun was discovered near the center of Messier 51, famous spiral nebula in the constellation Canes Venatici; a nova 80,000 times solar brightness was located in the constellation Aquila.

The new comets du Toit III, IV and V and Friend-Peltier were discovered; Comet Pons-Winnecke and Kopff's periodic comet, both last seen in 1939, were rediscovered.

Series of photographs taken with the coronagraph showed that tiny, spike-like prominences on the sun called spicules are more frequent than previously supposed and last only four or five minutes.

Half-a-dozen double stars were found to have either one or both components surrounded by rings of flaming gases rotating in the same direction as the stars. These Saturn-like rings are believed to surround many two-star systems and to have been formed early in the system's history.

Study of the infrared spectrum was found to reveal size and distance of the cooler component of double stars and the absolute magnitude of M-type stars which are rich in infrared rays.

Discovery of a double star composed of two white dwarfs was reported; five new white dwarf stars were found, bringing to about 75 the number of known white dwarfs.

Watch-shaped swarms of stars, with long spiral arms may be "young" galaxies that will develop into compact clusters of suns, it was suggested.

Two photoelectric cells in a balanced circuit were used to record automatically the passing of meteors or "shooting stars," and to measure their brilliance.

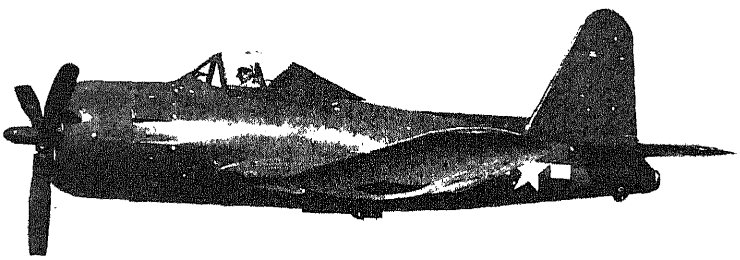
A brilliant fireball, seen and heard by many persons early in the morning of May 4, was determined from reports by observers to have burst at a low altitude southwest of Philadelphia, probably near Chester, Pa.

Evergreen plants may exist on Mars, resemblances between infrared-photographs of the spectrum of distant conifers here on earth and of portions of Mars indicate.

Infrared auroral display, detected in the night sky as far more intense than the ordinary persistent aurora, was believed due to a large number of nitrogen atoms in the high atmosphere.

Gases from one of the sun's flame-like clouds high above a group of sunspots were attracted to a neighboring prominence of fiery gases, giving information as to forces acting on the sun.

The atmosphere of Titan, Saturn's largest moon, was formed after the satellite cooled off, temperature studies indicated.



TWO POWER SOURCES—In flight this Ryan Fireball fighter can be operated on either its jet engine alone or the conventional power plant only, but for peak performance the two power sources are used together.

BIOLOGICAL SCIENCES

Powerful New Pesticides Released for Civilian Use

➤ SEVERAL powerful new pesticides, restricted to military and experimental uses during the war, were released for civilian employment; they include DDT and Gammexane (British) against insects, 1080 and ANTU against rats, 2-4-D and ammonium sulfamate against weeds, and G-412 and G-410 specifically against ragweed.

Germ-stopping substances similar in action to penicillin were found in lichens, in wilt-resistant tomato plants, in leaves of Scotch thistle, mullein and peony, and in the fruits of blueberry, currant, mountain-ash and honeysuckle.

Formulae for several effective mosquito repellents were released by the Army and Navy.

Heartbeats of birds, many times more rapid than those of humans, were counted with a sensitive electrical instrument attached to the twig on which the bird perched or even under the nest.

Plant disease viruses, far too small to be seen with any instrument, were studied by depositing gold films, eight Angströms thick, on protein particles of submicroscopic size and using an electron microscope.

Bacteriophage, foe of disease germs, formerly invisible, was seen through an ordinary microscope after being treated with a dye and irradiated with ultra-violet rays.

Bacteria-like parasites within the bodies of cockroaches were killed with penicillin; soon the cockroaches died also.

Fungus that causes one of the most destructive of plant diseases, flax wilt, was found to be a potential source of most of the B vitamins.

Unexpected new sources of quinine were located in South America: some species of cinchona were found more abundant than previously believed; the bark of other species was found to produce good yields of quinine.

Large-scale soilless gardens were established in a number of out-of-the-way places in the tropics to produce otherwise unavailable salad vegetables for Air Force personnel.

A variety of lettuce called Slobolt, that does not "go to seed" with warm weather, was announced.

Mosquito larvae were found to get cramps and drown when breeding ponds are treated with DDT.

Mushrooms, proverbially shortest-lived of plants, were found alive 35 years after being sealed up in glass tubes under high vacuum.

Oysters were induced to produce eggs in winter for research purposes by warming them up to mid-summer temperature.

Love-songs of mate-seeking mosquitoes were recorded on phonograph records for use in luring the pests to their death in insect traps.

Ergot, fungus drug used in childbirth, was successfully cultivated under tropical conditions in India.

Radioactive phosphorus injected into the body of a pregnant female mouse was found in the full-grown offspring three months later.

Plant growth was speeded by weak solutions of colchicine, the "evolution chemical" used previously to originate new species of plants by multiplying the heredity-bearing chromosomes of old ones.

Carotin, yellow pigment in plants, was found essential to reproduction in cattle.

Tomato plants were stimulated to highest production by protecting them from the heat of the early afternoon sun with tar-paper coverings.

Rubber was extracted from the leaves of *Cryptostegia grandiflora*, a tropical milkweed-like vine, through bacterial fermentation.

Ways were studied of utilizing for livestock feeds the B vitamin manufactured in the cow's stomach and excreted with digestive wastes.

Resumption of scientific expeditions began with plans for one early in 1946 to Nyasaland, South Africa, to study small animal life.

Genes, or heredity-determining units within a cell, were reported as being seen at work chemically influencing the course of physiology.

One species of black wasp was found to kill crop-devouring Mormon crickets at the rate of one million per square mile each season.

Hatchability of hens' eggs is not affected by low atmospheric pressures like those encountered during high-altitude plane flights, experiments showed.

Embryo corn plants, cut from kernels with dissecting needles, were successfully grown in sterile laboratory vials.

DDT-rotenone spray was proved practical and economical in controlling cattle ticks in the tropics, making cattle dips unnecessary.

Finely ground limerock mixed with DDT for use as a dusting powder was found to be inert to the insecticide and harmless to vegetation.

CHEMISTRY AND PHYSICS

Elements 95 and 96 Are Announced

➤ DISCOVERY of elements 95 and 96, made by bombardment of uranium 238 and plutonium 239 with high energy alpha particles, was announced, thus raising to four the number of trans-uranic elements discovered as the result of the atomic bomb research.

Discovery of neptunium 237, an isotope of element 93, was announced.

A 100,000,000-volt electron accelerator or betatron for X-rays was perfected; it may also produce other forms of radiation available before only in the cosmic rays.

A 100-ton electronic differential analyzer was announced; no longer needed for secret war research, it was used in solving scientific and industrial engineering problems, for which it was designed.

A tiny oscillator tube, more powerful than any broadcast station, but which gives off its power burst within one millionth of a second, has been used in radar, it was announced.

Automatic radar recording camera was developed that photographs the radar image on the radar oscilloscope while the operator is watching it.

The proximity or VT fuze exploded projectiles on approaching a target close enough to inflict damage; a miniature radio station in the nose of the shell sends out impulses which are reflected back by a target, the frequency of the echo changing as the target is approached.

Television pictures in full color were successfully transmitted through the air by use of ultra-high frequency radio waves.

Thin stainless steel film on optical glass disks, placed before wide angle lenses, was found to eliminate the problem of "hot spots" on aerial photographs.

An electrical micrometer, so sensitive that it can measure movements as small as one-tenth of a millionth of an inch without touching the object, was developed.

Knowledge of the ionosphere and of the relation of solar activity and geomagnetic and auroral conditions to short wave radio transmission was advanced to the point where long range prediction of reception became an actuality.

Chemical analysis of gases, liquids and solids was perfected by shooting X-rays through substances to determine the chemical elements present.

A new elastic electrical insulating enamel made from sand-based silicone was developed to withstand extreme temperature changes and exclude moisture.

Plastics plated with metal produced materials which were found to have inherent properties of the plastic in addition to the desired properties of the deposited metal.

Chemical test for the quality of butter was developed using xylol, as an aid in the ordinary taste and smell method.

Lightweight, fire-resistant building material, using cement and organic and inorganic fibers, which insulates against heat and cold and is non-rotting and termite proof, was developed.

Synthetic organic cements were developed which will hold metal plates without riveting or can be used to bond wood, plastics, rubber or fabrics to a similar substance or one to another.

An electro-chemical method of filtering water freed it of undesirable mineral salts by passing it through two beds of ion-exchange resins.

A perfect mold of optical glass weighing 379 pounds, the largest ever obtained for a scientific instrument prism, was made.

Vinyl chloride co-polymers, new rubber-like plastics, were made by passing acetylene and hydrogen chloride over catalysts.

Quick-molding odorless thermoplastic from cellulose and propionic acid, with electrical properties little affected by atmospheric change, was made possible by development of a commercially practical process for producing propionic acid from natural gases.

Sono-radio buoys, that pick up submarine noises by hydrophones and transform them into radio signals, were announced.

The 1945 Nobel prize in physics was awarded to Prof. Wolfgang Pauli, atomic research expert; the 1944 award in chemistry went to Prof. Otto Hahn, German authority on radio-activity and the atom; the 1945 award in chemistry went to Artturi Virtanen, Finnish bio-chemist.

EARTH SCIENCES

Complete World Weather Information Available

➤ COMPLETE world weather information was made available for forecasting when exchanges of meteorological data with Japan and Russia were developed.

There were 46 earthquakes of sufficient strength to record themselves on distant seismograph instruments; notable among them was a destructive quake in central Chile on Sept. 13.

A quake-caused tidal wave in November killed 4,000 people on the coast of India.

Radar can be used in obtaining weather observations, it was announced; approaching storms up to 200 miles away are indicated on a detecting screen.

A new yellowish-green gem stone was described, and given the name of Brazilianite for the country of its origin.

Constant pressure upper air charts replaced constant level charts as official Weather Bureau maps as a basis for domestic aero weather forecasts.

Maps showing trafficability of enemy country, sources of construction material, areas where underground water supplies could be obtained, and other geological features, aided Allied invasions.

Maps were made from the point of view of human comfort, showing the climate month by month and clothing needed.

For the first time a volcano in eruption was studied in the air above it from a helicopter; unusual lava flow formations unsuspected from the ground were observed and photographed in color.

Drilling of 237 oil wells in England, which produced 300,000 tons of crude oil, was announced.

Actual reserves of iron ore in the Mesabi range, Minnesota, were estimated to be capable of high production for another 100 years; the previous estimate was that they would be exhausted by 1950.

Discovery in the Southwest of new, large oil pools emphasized the need for intensive subsurface engineering and geophysical work in other likely oil-bearing strata.

ENGINEERING AND TECHNOLOGY

Loran Perfected as Navigation Aid

➤ LORAN, wartime navigation aid developed for air and surface ships, was perfected and many new installations made; ship location is determined by picking up on a cathode ray tube signals from separated shore radio stations.

A new pulse time modulation principle of transmission made possible twenty-four two-way simultaneous conversations on a single radio-frequency carrier wave.

Automatic dialing of all long-distance telephone calls by subscribers was announced as possible.

Television broadcasts from planes six miles above the earth was planned; this will give larger area coverage, making the impulses reach a greater distance than the 50-mile limit possible with towers on the ground.

An electronic eye for television, 100 times as sensitive as any previously used, extended the lighting range possible in pick-up and the depth of perception.

Television receivers were developed which will show larger, brighter and clearer pictures due to new high-voltage tube and new plastic screen.

Radar apparatus for vessels which will detect obstacles above water through darkness, fog and storm at distances up to 30 miles was developed for commercial ships.

An easy-to-use high-speed camera with self-contained light source was developed for taking pictures of surgical operations.

A turbo-charged gas-diesel engine was developed possessing a 40% thermal efficiency, delivering more power in proportion to fuel consumed than any type of engine yet developed.

Model of an engine with a ram-jet motor of unusual design, claimed to be the simplest engine in the world, was demonstrated.

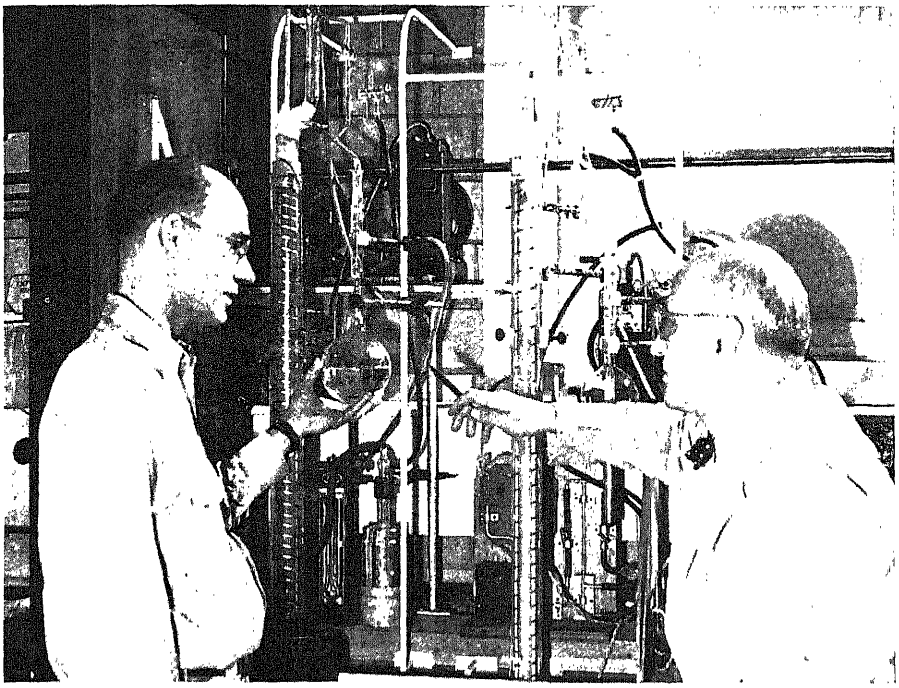
Smoke from locomotives is lessened by use of properly designed steam air jets and of adequate mufflers.

Powerful, high-speed coal-burning steam turbine locomotive was designed to have the cab and boiler section between the coal and water compartments.

A new method of admitting gas with the diesel engine air intake was developed, making possible the use of either gas or oil as a fuel without any electric sparking device.

New safety fuel for aircraft was developed that does not form enough inflammable vapors in the air to ignite except at temperatures above 100 degrees Fahrenheit.

Successful extraction of 17 to 40 gallons of petroleum from one ton of oil shale was made possible by a new process.



SYNTHETIC CAFFEINE—Volume production will be undertaken by the Monsanto Chemical Company, utilizing an improved process worked out by Dr. Oliver J. Weinkauff, left, under the supervision of Dr. Lucas P. Kyrides, organic research director of the company.

Lubricating oils were found to be improved by the addition of small amounts of selenium compounds, reducing the tendency to oxidize and form sludge and gummy resins in engines.

A wax-free lubricant was developed for internal combustion engines having unusual advantages over mineral oil, particularly in cold weather.

Substitute for gasoline giving one-fourth more power in a properly designed internal-combustion engine was developed, using a blend of ethyl alcohol, diethyl ether, acetone and butanol.

Inexpensive production of thiophene from petroleum permitted its use in the plastic, pharmaceutical and dyestuffs industries.

Industrial diamonds were cut by an electric arc, a process two to four times as fast as present methods.

An all-electric torpedo, fired under water and gyroscopically controlled, making no tell-tale wake of air bubbles to warn the enemy, was announced.

An improved infra-red gas analyzer was developed that gives a continuous analysis of gaseous organic compounds during their manufacture.

Electronic vulcanization of rubber, instead of the familiar heating method, was developed to speed production and give more uniform and higher quality products.

Synthetic tires as good as prewar natural rubber tires were made from a special variety of GR-S synthetic rubber with a rosin-based soap replacing fatty acid soap as an emulsifier.

Use of helium to inflate heavy airplane tires was announced as practical for a weight-saving device.

Electronic method of applying a phosphor coating to the inner walls of fluorescent lamp tubes was found to speed production and result in better light.

A process for making ethyl chloride by reacting chlorine with waste products from other ethyl chloride plants instead of hydrochlorination of alcohol or ethylene was announced.

A new glass-to-metal sealing method provides a seal tight enough to protect delicate electrical instruments immersed in water for days.

A high-strength phenol formaldehyde resin adhesive, that is not only waterproof but has a short curing time at high temperature, was used in making air-sea rescue boats.

Cloth shrinkage was reduced and controlled by treating wool and wool blends with a melamin resin.

Artificial bristles for paint brushes were made from casein, protein ingredient of milk.

The physical properties of a yarn made by coating cotton, rayon or fiberglas with plastic may be changed by varying the formula of the plastic used.

Bagasse, a waste product from sugar factories, was successfully used to make a new plastic molding compound.

Fluorescein, a chemical compound used by downed airmen to color surrounding water to mark locations, helped detect leaks in underwater fuel pipelines.

Fiberglas mats, wrapped around underground oil, gas and other pipelines, protected them against electrolytic action and corrosion.

Partially acetylated cotton cloth was found to resist mildew and failed to rot during six months in soil teeming with rot-producing micro-organisms.

Sawdust and other wood wastes were made into fine quality hard wallboard by a new chemical process and use of a hydraulic press.

Processed wood was compressed by a method which assures that although the wood swells with atmospheric moisture, it will return to its original compressed thickness when dried.

A direct radiotelephone circuit between San Francisco and Wellington, New Zealand, was put into operation.

INVENTIONS

Register of Salable Patents Is Published

➤ THE PATENT OFFICE began publication of a register of salable and licensable patents, thus providing a simple means for manufacturer-inventor contacts and assuring an increased development of patents.

Notable and interesting inventions patented during the year include:

Anti-knock motor fuels produced through the addition of compounds of heavy metals other than lead.

An activated clay filter that takes tetra ethyl lead out of gasoline and permits its use as a stove fuel or as a cleaning fluid.

An apparatus that super-powders coal to get maximum heating value from anthracites and other coals of high-ash content.

An apparatus employing streams of electrons or gamma rays to search thick steel plates for hidden flaws.

A process that yields by the same operation magnesium, alloy steel and cement from silica-containing ores of magnesium.

A method for smelting magnesium directly from its silicate ores; a method for extracting magnesium from sea water, using the water-softener principle.

A low-pressure, low-temperature process for separating magnesium from its commoner ores.

Polymerized silicones used with additions of other chemical elements to make new resin-like substances.

A method of salvaging pure sulfur from hydrogen sulfide, through the use of sulfur dioxide under high pressure and temperature.

Electric wires with an insulating coating of sodium silicate that is flexible and not hygroscopic.

A plastic sheathing between copper wire and rubber insulations that protects the rubber from chemical damage by the copper.

An extremely hard tool steel containing carbides of tungsten or vanadium, made by a new sintering process.

A method for making wide strips of thin, flexible glass which can be used instead of mica for most purposes.

A sintering process that produces thin-walled articles by spreading the metal or carbide powder mixed with oil on the mold.

A system of microphotography on rectangular pieces of film suitable for filing in card indexes.

Chemical separation of actinomycin into two fractions, one of which is powerful in its action against certain microorganisms.

Simplification of the process for isolating gramicidin, germ-checking substance similar to penicillin, from bacterial cultures.

A high-wheeled locomotive with tubular boiler that permits a lower placement and better balance of weights.

A war-born high explosive called pentolite, consisting of PETN, mixed with TNT, insensitive to shock, but more violent than TNT.

A gas-mask filter medium made from highly adsorbent cellulose fibers.

Rubber separated out of macerated native goldenrod by adding an alkali salt to the flotation medium.

A method of freezing foods by constant agitation in a nearly saturated atmosphere, producing uncaked frozen products.

A method of preserving food by use of a highly volatile substance such as ethylene oxide or methyl bromide which does not injure the product.

Flexible plastic bags as containers for sterilized foods, instead of the conventional glass or metal.

A way of making for paint fillers silica grains as small as the smallest bacteria by pouring sodium silicate into methanol and bubbling carbon dioxide through the solution.

A new orange variety of high quality that ripens from five to eight weeks earlier than other Florida oranges.

A new type motion picture theater that has the screen on the ceiling and reclining couch seats.

A method for detecting small amounts of poison in the air by dissolving the gas molecules and then measuring the electrical conductivity of the solution.

A circuit of water channels that tests ship models as a wind tunnel does airplanes.

A flexible "iron lung" that encloses the torso only and enables the patient to change position and move more freely.

Synthetic chewing-gum bases consisting of fatty acids or hydrogenated resins.

MEDICAL SCIENCES

Streptomycin Used for T. B. and Typhoid

STREPTOMYCIN, which proved effective in controlling tuberculosis in guinea pigs, was given to 34 human patients with a limited suppressive effect; recovery from typhoid in three of five cases suggested that the drug may bring recoveries and prevent carriers; streptomycin also checked the growth of Friedlander's bacilli and Klebsiella in laboratory experiments. (See front cover.)

An operation for saving the lives of "blue babies" born with certain types of heart defects by joining a branch of the aorta and one of the pulmonary arteries to increase the flow of blood through the veins was devised and successfully performed on many patients.

Identity of BAL (British antilewisite) was announced as 2, 3 dithiopropanol with reports that this alcohol, developed for local use as a skin decontaminant in protection against the war gas, had been developed into an effective remedy for arsenic and possibly mercury poisoning.

Vaccination of all U. S. Army personnel for protection against influenza was ordered.

Penicillin made 25 of 39 babies with congenital syphilis well, brought speedy recovery from trench mouth, and brought improvement for patients with brain and nervous system syphilis.

Muscular dystrophy remedy may come from a new chemical made from the two vitamins, tocopherol and inositol, it was reported.

The virus of horse "sleeping sickness" was isolated from chicken mites.

A new chemical weapon, gamma-(p-arsenosophenyl)-butyric acid, against African sleeping sickness, was reported to give speedy cure of early cases.

Vaccine against dengue, or "break-bone fever" may result from first success in mouse passage and consequent attenuation of the virus.

A new weapon against malaria was developed, consisting of a portable plant for extracting, at low cost, quinine and other antimalaria drugs from the bark of cinchona trees in the remote spots where they grow.

Artificial eyes made of plastic instead of glass were developed; the plastic eyes resemble natural eyes more closely than do glass ones and are more comfortable to wear.

Riddle of what causes one kind of heart disease, known medically as acute interstitial myocarditis of unknown etiology, may be on the way to solution with the discovery of the substance, apparently a virus, that causes similar ailment in apes and smaller animals.

Evidence was found that infectious hepatitis spreads through contaminated drinking water; this is the first satisfactory evidence that a virus disease can be naturally acquired by humans through water; gamma globulin, immune substance from blood, gives protection against it.

Heparin, anti-blood clotting chemical, may become means of preventing gangrene and loss of limb after frostbite, extensive studies indicate.

A skin graft operation on a hemophiliac was performed successfully for the first time; an active thrombin preparation applied to the place from which the skin graft was taken apparently was responsible for saving the patient from bleeding to death from this wound.

Sensitivity to the Rh blood factor may last for lifetime, investigations showed; a blood bank to save the lives of mothers and babies threatened because of a difference between the mothers' and fathers' blood was announced; the Rh factor was found to be absent in chimpanzees.

From 10,000 to 15,000 blind persons may have a chance to see again as the result of the formation of an eye bank to collect and make available human corneas for grafting.

Persons whose eye lenses have been removed in cataract operations can see ultraviolet radiations invisible to normal eyes, it was discovered.

Recovery from cholera can be assured in every case, it was announced, by new treatment combining sulfadiazine, plasma and saline injection.

Severe poisoning from breathing the fumes of carbon tetrachloride was successfully treated with methionine, one of the amino acids.

Experiments demonstrated for the first time that there is a definite link between the kidney and ovarian functions.

Hearts were successfully transplanted in warm-blooded animals for the first time.

A new approach to conquest of venereal disease by mass testing plus penicillin treatment was pioneered in Birmingham, Ala., where, although new state law required blood tests and treatment, when necessary, for all citizens between 14 and 50 years. 260.216 came voluntarily for testing as result of high pressure publicity program.

Syphilis and tuberculosis case finding were combined for the first time in a 45-day campaign in Savannah, Ga.

Actin was announced as a previously undiscovered protein which plays a part in muscle contraction.

FLU VACCINE—Fluid contents of an egg are being sucked into a chilled bottle as one of the steps in making the Sharp and Dohme influenza virus vaccine.

Dentist's drill may be replaced by a new device which operates on the sandblast principle; it is painless, swift and silent, it was announced.

Penicillin was put on the market for civilian use on March 15.

New ways to give penicillin include: by mouth, using sodium citrate as a buffer against stomach acid; mist inhalations; mixing with special gelatin and chemical to reduce number of injections needed; injections into artery for severe infections of arms and legs; in lozenges; in gelatin capsules; more effective penicillin treatment may result from a new substance in which it is combined with albumin of human blood.

The cause of toothache at high altitudes, studies indicate, is a disturbance of circulation in the pulp of the tooth which prevents equalization of pressures during change in altitude.

Possible substitute for a scarce heart disease medicine, fogarine, has been found in a chemical from an Argentine tree.

A chemical from mushrooms, tyrosinase, was studied as a promising cure for the itch of poison ivy.

The chemical structure of streptomycin was almost completely worked out.

Influenza viruses cultured on two different kinds of living tissue, chick embryo and mouse lung, were shown to be chemically and physically identical.

A new remedy and preventive for athlete's foot was found in undecylenic acid, a fatty acid found in sweat.

Discovery of a new vitamin A, twin to the one already known, was announced.

Thiouracil, a chemical which suppresses the thyroid gland hormone, helped seven out of 10 patients with angina pectoris, it was reported.

A simple method recently developed as an aid in the diagnosis of cancer of the uterus has been found helpful also in the diagnosis of cancer of the kidneys, bladder and other organs of the genito-urinary tract.

Absenteeism and turnover were reduced and work performance improved when a vitamin supplement was given workers in an aircraft plant.

The mold source of penicillin was found to be a good source of vitamin D_2 when irradiated with ultraviolet.

An antianemia vitamin factor, vitamin Bc conjugate, was isolated in a new pure form for the first time.

One of the new B vitamins, folic acid, was reported to have anti-cancer activity; spontaneous cancers in mice disappeared in the laboratory tests.

All the family's bills for sickness, injury and childbirth can now be paid for $6 a month under a new, expanded medical care plan launched in New York.

At the request of the Surgeon General of the Army, the National Academy of Sciences and the National Research Council created a committee for developing the best possible artificial limbs for war veterans.

The following advances in germ-fighting were made: Dicumarol, anti-blood clotting substance, has anti-germ activity as well; material obtained from a strain of the fungus *Aspergillus fumigatus* checked TB germs in test tubes; a mold from human hair stopped typhoid and dysentery germs; the fungi that cause athlete's foot yielded an anti-germ substance; gramicidin, still potent against bacteria, was made less poisonous to animals; a chemical from pine trees may prove useful as an antiseptic for humans; anti-germ activity was found in buttercup juice; sulfa drugs were made more effective against certain bacteria by use in combination with dyes; a new antibiotic substance, "puchiin," resembling penicillin in its action, was found in Chinese waterchestnuts; bacitracin, germ-checking substance of the penicillin type, was isolated from bacteria found in wounds.

Some strains of influenza virus can act like a poison, damaging the liver and other organs, as well as causing the disease, influenza, studies indicated.

Blackout of eyesight in aviators during sharp turns or dive pull-outs at high speeds is due to a temporary anemia in the eyeballs themselves; it can be prevented by suction applied to the eyeballs by special goggles.

Eyes need protection against longer wavelengths of ultraviolet light than was previously supposed; damage to sight may occur without obvious signs of eye injury, studies indicate.

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Histoplasmosis, previously considered rare and always fatal disease, is apparently widespread in mild form and may be mistaken for healed tuberculosis, X-ray pictures in tuberculosis survey indicated.

Records for recovery from extensive burns were apparently broken when a Marine who had 83% of his body burned was able to return to duty within three months.

Cancer research progress was given new impetus by $4,000,000 grant to establish Sloan-Kettering Institute for Cancer Research at Memorial Hospital, New York City, and by expansion of research program by American Cancer Society.

Pain, tenderness and wasting of muscles in some cases of rheumatoid arthritis was apparently explained by finding inflammatory nodules widely distributed in the skeletal muscles and the peripheral nerve trunks.

Encouraging results with neostigmine in paralysis, rheumatoid arthritis and crippling from injury or infection were reported.

Daily doses of the chemical, pregnenolone, were reported to have anti-fatigue effects.

A new anti-bleeding material prepared from blood plasma and human placentas was announced; extensive studies are necessary before it can be tried on patients with hemophilia.

Study of first, second and third children born shows that the unusually large number of births in the United States during the War years 1941-44 does not mean more children per family, but mainly the starting point in these years of hundreds of thousands of families which were postponed by the depression and of others which would have been started in later years if there had been no war.

A study of all families of Indianapolis showed that Protestant couples have 6/7 as many children as Catholic couples, while Jewish couples and mixed Protestant-Catholic couples have about 9/10 as many as Protestant couples: the larger size of Catholic and Protestant families is especially noticeable in the upper income and educational classes, among the poorer people with little schooling the Protestant families average as large as or larger than those of Catholics.

A systematic study of the pre-natal stages of human behavior demonstrated a continuity in the patterning of behavior in embryo, fetus, fetal infant and neonate.

Greater amounts of anti-germ chemicals such as penicillin may come from neutron bombardment of mold spores, it was announced.

Discovery of a change in blood clotting caused by penicillin, pointing both to possible danger and possible further benefits from the mold chemical, was announced.

New devices to help deaf people learn to talk and use the telephone and enjoy radio by seeing sound patterns for speech and music were developed.

Better treatment of cirrhosis of the liver may come through use of a new goiter medicine, thiouracil, it was announced.

The Nobel prize in physiology and medicine for 1945 was awarded to Sir Alexander Fleming, discoverer of penicillin, and Sir Howard W. Florey and Dr. Ernst B. Chain, who fathered its development into a life-saving remedy.

An Institute of Forensic Medicine, first of its kind in the world, will be established at New York University College of Medicine, it was announced.

The Red Cross will continue to operate for civilians, in cooperation with an approved sponsoring health or medical agency, the blood donor service which has been so successful in supplying blood, plasma and albumin to the armed forces, it was announced.

PSYCHOLOGY AND PSYCHIATRY

Psychological Warfare Has Important Role

➤ FOR THE FIRST TIME in warfare all the events in a campaign, diplomatic and also military, were dictated by the considerations of psychological warfare; leading, after the military defeat, to the final surrender of Japan without armed invasion, saving an estimated half-million American lives.

Ten points of human nature considered essential as bases for a lasting peace were framed and agreed upon by more than 2,000 American psychologists, and sent to members of Congress to aid them in their peace planning.

Measures for the prevention of another war, advocated by a national society of psychologists, emphasized the need for immediate and enlarged supplies of food for the starving people of Europe and Asia because "starvation sows the mental seeds of war."

A new index was found for measurement of social development in the individual's willingness to try again tasks at which he has failed.

People most likely to believe rumors are older persons, those less informed and working in non-professional occupations and persons who "want" to believe rumors because of grudges or personal needs, a wartime survey indicated.

High altitude causes loss in ability to speak clearly, a fact that may make it difficult for air crews in the stratosphere to understand each other by phone.

Given the same environment, studies indicated that racial differences are so small that they are less than differences between the two sexes of the same race.

Smell-blindness was found, unlike color-blindness, to be a dominant, non-sex-linked characteristic; it was demonstrated that a smell-blind person was able to distinguish flavors.

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Successful training of a Rhesus monkey to sort objects by color when given a cue in the form of a colorless block made possible new research on this type of abstract thinking and possibly use of these animals in study of brain injuries such as those suffered by soldiers in combat.

Although rapid learners retain what they have learned better than do their slower associates, they lose their advantage after long periods of retention; a month or two later the slow learners are found to remember the most, experiments showed.

Use of baby development tests on infant chimpanzees showed that in general the ape baby develops at an earlier age than the human, but that human babies can sit alone sooner, probably because of differences in structure.

Study of pure strains of dogs differing as much as possible in emotion and intelligence was undertaken to increase knowledge of the probable influence of heredity on these characteristics in humans.

Chimpanzees do not suffer from mental disease or malignant growths, it was announced after study of 100 of the animals.

An unusual mental illness affecting children of intelligent parents was observed, in which the symptoms are inability to use language for communication, disregard of people and compulsive desire to avoid change.

A survey was made of the number of men discharged from the service who will need psychiatric care and the hospitals and other facilities for caring for them, revealing a shortage of at least 10,000 psychiatrists with the necessary auxiliary staffs.

A simple 92-question "yes"-"no" test, developed for the armed services, was found highly accurate for screening out men with serious personality or nervous difficulties.

Electric shock treatment for mental illnesses causes impairment of memory and ability to re-learn due to direct effect on brain tissue, experiments on rats indicated.

Blind people were found to utilize the echoes of their footsteps to "see" obstacles with surprising accuracy.

Veterans with nervous ailments were aided by use of psychodrama, a therapeutic type of drama, in which the actors do not learn parts, but make them up spontaneously to meet the situation being enacted; this technique was also used successfully for training psychiatric social workers and persons in supervisory positions.

Psychology was represented in exchange fellowships to other countries; one exchange professor going to Brazil and another to Turkey.

Maladjusted students can be picked out and academic work of normal students predicted by use of the Rorschach Test, in which people are asked to report what they see in standardized inkblots, experiments showed.

Science News Letter, December 22, 1945

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GENERAL SCIENCE

Ten Important Science Developments of Year

➤ THE TEN most important advances in science made during 1945, as picked by Watson Davis, director of Science Service, are:

1. The atomic bomb and the practical release of nuclear energy of potential industrial use.
2. Discovery and verification of the trans-uranium chemical elements 93, 94, 95 and 96, and the large-scale production of 94, plutonium, for use in the atomic bomb.
3. Use of the antibiotic, streptomycin, for the treatment of many diseases, especially those not cured by the sulfa drugs and penicillin.
4. Development of the proximity fuze.
5. Development and use of loran, which allows determination of exact positions at sea and in the air through use of exactly timed radio signals.
6. Use of psychological warfare methods in hastening the Japanese unconditional surrender.
7. Development and use of BAL, a kind of alcohol, for the treatment of arsenic and mercury poisoning.
8. Development and use of the chemicals, ANTU and 1080, for killing rats and other rodents.
9. Successful transplantation of hearts in warmblooded animals.
10. Steps taken in Congress for the establishment of a National Science Foundation.

Some of these developments were actually made before 1945 but on account of war secrecy were not announced until 1945.

Science News Letter, December 22, 1945

Hundreds of tons of *murumuru*, a Brazilian vegetable wax, are now being used by American soap manufacturers in place of products formerly obtained from the Far East.

A *quinine factory*, erected by the Belgian Congo government during the war, is producing 2,200 pounds of quinine salts a month, half of which is exported; the plant is operated without view to profit.

Do You Know?

There are over 100 distinct breeds of *pigeons* in America.

Most *oysters* are from four to five years of age when marketed.

Greater hardness is provided by the use of *calcium chloride* in concrete.

Headaches are the most common reason for consulting physicians.

Helicopters for farmers, foresters and others are to be constructed in Australia by a local company.

The *petroleum fly* breeds in pools of waste petroleum and feeds upon other insects that have fallen into the pool.

The body as a whole contains more *lime* than any other inorganic material because of the high concentration of calcium phosphate in the bones.

Argon, an inert colorless gas found in the air, is used in modern high-efficiency incandescent lamps; it enters into no known chemical compounds.

Nerve cells in man have projecting filaments never more than one five-thousandth of an inch thick, yet may grow to a distance three or four feet from the cell.

Lactic acid, used normally in the manufacture of such essentials as leather, textiles, foods, and liquors, was used during the war in a fire-quenching solution to prevent explosions in tank interiors.

The United States is not a heavy consumer of *rice* in comparison to certain other countries, but it produced and exported over 490,000,000 pounds milled during the year from August 1944 through July 1945.

Civilian *aerosol bombs* for household use in killing insects must, under government regulations, contain 3% DDT and a suitable amount of pyrethrum dissolved in a liquid gas under pressure that forms a fine mist when released.

Radio *loudspeaker equipment*, operating at a power more than 1,000 times that of ordinary apparatus, was used in American airplanes two miles above the earth to let Japs in isolated places know the war was over.

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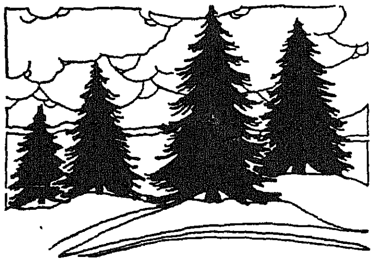
Several outstanding books appeared first as serials in *Instruments*. The one advertised above is but one example.

ECOLOGY

NATURE RAMBLINGS

by Frank Thone



Who Are God's Friends?

"Peace on earth to men that are God's friends."

So runs a new English translation of he song the angels sang on the first Christmas.

This is a hard saying indeed, a more evere condition than is imposed even by he Vulgate's *"pax hominibus bonae voluntatis."* We may all claim to be men of good will, however badly our deeds may fall behind our professions; but who would have the temerity to make outright claim of friendship with God? Only the greatest saints might fairly do that, but none of them would, because of humility.

We can, of course, fall back on Abou Ben Adhem's alternative, and offer love of our fellow-men as the best substitute at our command. Certainly there is need for all of that we can muster up, in this first winter after the ending of war but before the advent of real peace: no end of our neighbors' trespasses against us to be forgiven, and no end of want and misery to be relieved. Very nearly a saint's-size task in that assignment alone.

Yet even after the last homeless refugee has been provided with a roof and the last hungry child fed, there will still remain unhealed wounds to be tended. War's havoc in the fought-over lands, and war's insatiable demands even here in safe America, have done horrid things to the land we live on—mined fields of their fertility, stripped forests faster than they can re-grow. Our mother the earth, as St. Francis called her, bleeds grievously. We are even constrained, by the very need to relieve human distress for yet another season of emergency, to carry on the exploitation a little longer—like the pelican's offspring in the pious old myth.

As soon as we are able, however, it is imperative that we use utmost diligence, and all the knowledge and skill we have, to heal these wounds that war has left in the earth. Soil conservation practices must be resumed and extended, rangelands given their chance to grow new grass, forests restored and their shy inhabitants encouraged to return.

"The earth is the Lord's, and the fullness thereof," declares one of the noblest of the Psalms. We have presumed upon that fullness too long, at first through thoughtless selfishness, now through sheer necessity. If we aspire even to the penumbra of friendship for God, we must render again to him the things that are his.

Science News Letter, December 22, 1945

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PUBLIC HEALTH

Influenza Higher Than For Several Years

➤ WITH 50,000 cases of influenza reported in one week, a higher figure than for a good many years past at this season, health authorities around the country are wondering whether this winter will bring another epidemic like that in 1918.

Cases reported to the U. S. Public Health Service for the week ending Dec. 8, latest on which figures are available, totalled 49,667. Figures from Rhode Island and Maryland have not yet been received and may push the total for the week over 50,000.

The actual number of cases is probably far higher than the reported number. In Oregon, for example, only 45 cases were reported to the state health officer but that official estimates, on the basis of school absenteeism and similar reports, that there were probably 4,100 cases in his state during the week ending Dec. 8.

Largest number of cases were reported from Kentucky, 15,358. Texas reported 7,332; Kansas 6,848; Utah 4,241, and West Virginia and Virginia each over 3,000.

The outbreaks are due to Type B influenza virus which until last spring had not produced any sweeping epidemics. At that time outbreaks of Type B influenza running into thousands of cases each occurred at Army installations. These scattered outbreaks, possibly heralding a sweeping epidemic in the fall and winter, caused the order for vaccination of all Army personnel in October and November.

The vaccine used by the Army is effective against Types A and B virus. Whether the entire Army has now been vaccinated and whether those vaccinated are escaping the disease as expected is not yet known. There has not been enough time for all vaccination records and reports on current cases to reach the Surgeon General's Office.

Manufacturers of the vaccine hoped to have supplies available for civilians by the first of the year. All that had been produced previously was needed by the Army.

Science News Letter, December 22, 1945

PALEONTOLOGY

Many Fossil Bones Brought from Colombia

➤ FOSSIL bones of an animal that looked like a wolf and lived like a wolf but was really more closely related to opossums and kangaroos have been brought from Colombia to the University of California by Dr. R. A. Stirton, who made the collections while in the South American republic as a Guggenheim fellow. This marsupial wolf, which is only one of 28 species dug up, lived about 30 million years ago, Dr. Stirton stated.

He also brought back the fossil remains of several species of reptiles believed new to science. These are of Cretaceous age, or about 100 million years old.

Science News Letter, December 22, 1945

MEDICINE

Drug for Epilepsy

Tridione gives good results in petit mal epilepsy of childhood. It may bring new knowledge of underlying problems of brain and nerve physiology.

➤ GOOD RESULTS in treatment of petit mal epilepsy with a new drug, Tridione, are reported by Dr. William G. Lennox of Harvard Medical School. (*Journal, American Medical Association,* Dec. 15.)

In a period of days to weeks, the frequent daily seizures were stopped by the new drug in more than a fourth (28%) of the 50 patients on whom Dr. Lennox reports. The scores of daily seizures were reduced to less than a fourth their usual number in 52% of the patients, but were little affected in 20%.

Tridione gives the "most dramatic" results of any drug yet tried for petit mal epilepsy, Dr. Lennox finds. Its chemical name is 3, 5, 5-trimethyloxazolidine-2, 4-dione. It is made by the Abbott Laboratories but is not yet on the market. It is taken in capsules, doses varying from 15 to 30 grains, or three to six capsules, daily.

Some patients after taking the medicine for a time have been able to get along without it for several months. Whether they will need it again cannot be determined as yet.

Skin rashes and sensitivity of the eyes to bright daylight, which disappears a week or 10 days after the medicine has been stopped, seem to be the only unpleasant effects. Improved appetite, weight gain, improvement in school performance or deportment in children are among the pleasant side effects.

Besides the practical effects of Tridione in relieving petit mal epilepsy, Dr. Lennox believes it may bring new knowledge of underlying problems of brain and nerve physiology.

It is petit mal, not grand mal, epilepsy which is helped by this new drug, Dr. Lennox stressed. The petit mal type usually occurs in childhood. Seizures begin and end abruptly. They are more likely to occur in the minutes or hours after rising. They are less frequent during physical or mental activity. Girls are more often affected than boys.

The seizures may consist of a transient lapse of consciousness or "blackout," or of a single quick contraction of muscles like a jerk, or of a sudden loss of posture control in which the child falls down suddenly but usually picks himself up immediately. These seizures may come from five to scores of times a day. Some patients have had as many as 200,000 seizures. Patients with "pure petit mal epilepsy" seem unusually bright and score high on intelligence tests, but the frequent seizures interfere with schooling.

Brain-wave records of this type of epilepsy show characteristic patterns. The pure petit mal epilepsy has a spike and dome pattern.

Distinguishing between this and grand mal epilepsy with its less frequent but severe convulsions and psychomotor epilepsy in which there is loss of memory is important because the basis of treatment is exactly opposite. Sedative drugs, including the recently developed dyphenylhydantoinsodium, are helpful in grand mal epilepsy but not in petit mal.

Stimulating drugs, Dr. Lennox reports, are more effective in petit mal epilepsy. One of his adult patients incapacitated by this epilepsy found for himself that he could get relief only by drinking five to 10 cups of coffee daily. Caffeine either in tablets or coffee has been found helpful for some patients but not all, and it produces too much nervousness or wakefulness to be useful in some cases.

Science News Letter, December 22, 1945

ELECTRONICS

German Magnetic Tape Machine Brought to U. S.

➤ A NEW German magnetic tape recording machine, to make records of code or voice messages, obtained by the Army in Germany, has been on public display recently in the Department of Commerce, Office of the Publication Board. Details concerning its assembly and use have been prepared, translated from the German, and are available from OPB in photostatic or microfilm form at a reasonable cost for American manufacturers and others.

The equipment, which operates on alternating current, is designed primarily for connection to a radio receiver for recording, and to head-phones for playback. The signal from the receiver passes through an amplifier to the recording head, which magnetizes the coating on the tape. The exact composition of the tape is not known, but it appears to be a plastic composition coated with material having high magnetic qualities.

The tape is very thin but fairly strong, and can be demagnetized and reused many times without signs of wear or deterioration. Each tape is about a half-mile in length on a single reel, and provides a recording time of about 45 minutes at average ribbon speed.

One of the interesting features of this machine, in Germany known as the Tonschreiber, is a pitch-restoring head. This device, used when the tape is played back at speeds other than the recording speed, permits restoration of the original pitch.

Science News Letter, December 22, 1945

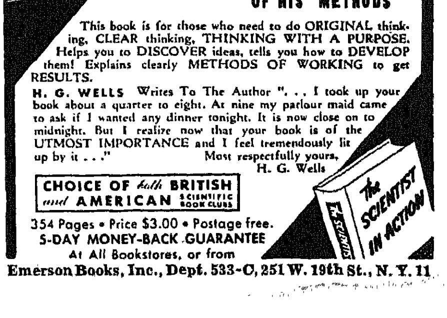
ENGINEERING

Two 1500 Horsepower Engines in One Unit

➤ A NEW powerful diesel-electric locomotive, completed this month by the Baldwin Locomotive Works, is distinctive in that it has two 1500 horsepower engines in a single unit instead of the usual two or more units coupled together to give the needed power. It is for the Seaboard Railway, to rush fresh vegetables and fruit from Florida to the northern markets.

The new locomotive has two supercharged engines in one cab. One of its most important advantages is that the over-all length is less than that of a locomotive with the same amount of power in two or more units. The engines drive generators that furnish electric power to operate motors on eight of the locomotive's 12 axles. Although capable of a speed of 120 miles an hour, the maximum speed restriction of the new locomotive is 85 miles.

Science News Letter, December 22, 1945



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• Books of the Week •

ATOMIC ENERGY IN WAR AND PEACE—Gessner G. Hawley and Sigmund W. Leifson, *Reinhold,* 210 p.. illus. and diagrams, $2.50. A readable condensation of the vast new subject which the title indicates.

AVIATION FACTS AND FIGURES—Rudolf Modley, Ed. *McGraw-Hill,* 173 p., tables, $2.50. An appraisal of the true value of air power and its impact upon military and economic security, emphasizing the importance of civil aviation and aircraft manufacturing.

CONSTITUTION OF THE UNION OF SOVIET SOCIALIST REPUBLICS—*Embassy of the Union of Soviet Socialist Republics,* 31 p., free. The text of the Constitution (Fundamental Law) of the Union of Soviet Socialist Republics, as amended and supplemented by the First, Second, Third, Sixth, Seventh, and Eighth Sessions of the Supreme Soviet of the USSR.

DICTIONARY OF EDUCATION—Carter V. Good, Ed.—*McGraw,* 495 p., $4. Exact definitions of educational terms.

ELECTRONIC DICTIONARY—Nelson M. Cooke and John Markus—*McGraw,* 433 p., illus., $5. An up-to-date, well illustrated glossary containing clear-cut and accurate definitions of nearly 6,500 terms used in radio, television, industrial electronics, communications, etc.

ELEMENTARY ELECTRIC-CIRCUIT THEORY—Richard H. Frazer—*McGraw,* 434 p., diagrams, $4. A systematic introduction to basic concepts of electro-magnetic waves, antennas, electromagnetic horns, wave guides, etc.

FACTS AND FIGURES ABOUT INFANTILE PARALYSIS—*The National Foundation for Infantile Paralysis,* 30 p., charts, free. A compilation of figures from an authoritative source.

FLAVOR—E. C. Crocker—*McGraw,* 172 p., tables and illus. $2.50. A comprehensive book for food technologists, tasters and others concerned with commercial aspects of flavor.

HYPOANALYSIS—Lewis R. Wolberg, *Grune & Stratton,* 342 p., $4. An account of the hypnoanalytic treatment of a patient followed by a discussion of the theory and practise of hypnoanalysis. A technical book for psychiatrists.

INTRODUCTION TO INDUSTRIAL CHEMISTRY—W. T. Frier and A. C. Holler—*McGraw,* 368 p., illus., tables, $3. An elementary course designed for the use of those who have had little scientific background.

INTRODUCTION TO MAGNESIUM AND ITS ALLOYS—John Alico, *Ziff*—183 p., diagrams and illus., $5. A survey of available information on magnesium. Of interest to metallurgical students as well as to those concerned with the practical aspects of the fabrication of metals.

AN INTRODUCTION TO PHYSICAL ANTHROPOLOGY—M. F. Ashley Montagu—*Thomas* 325 p, illus., charts, $4. For the general reader interested in the basic study of man.

NORTH AMERICAN GAME FISHES—Francesca Lamonte, *Doubleday*—202 p., illus., $3. A non-technical guide identifying and describing fresh and salt water game fishes in North American rivers, lakes, brooks, bordering seas, and oceans.

PREDICTION OF THE ADJUSTMENT AND ACADEMIC PERFORMANCE OF COLLEGE STUDENTS BY A MODIFICATION OF THE RORSCHACH METHOD—Ruth Learned Munroe—*Stanford Univ. Press,* 104 p., charts, $1.25 paper, $2 cloth. A study of the Rorschach responses of hundreds of entering students at Sarah Lawrence College compared with their competence in academic work and with their social adjustment in college.

REPORT OF THE SECRETARY OF THE SMITHSONIAN INSTITUTION AND FINANCIAL REPORT OF THE EXECUTIVE COMMITTEE OF THE BOARD OF REGENTS 1944—*Government Printing Office,* 116 p., illus., 25 cents. Contains detailed appendix for: the National Museum; the National Gallery of Art; the National Collection of Fine Arts; the Freer Gallery of Art; Bureau of American Ethnology; International Exchange Service; National Zoological Park; Astrophysical Observatory.

SUGGESTED SCHOOL HEALTH POLICIES: A CHARTER FOR SCHOOL HEALTH—National Committee on School Health Policies—*Health Education Council,* 46 p., Second ed. rev. 25 cents. Proposals made by 15 national organizations concerned with school health.

WAR AND PEACE AIMSS Extracts from statements of United Nations leaders. *United Nations Information Office,* 192 p. 75 cents. An official compilation.

WHAT EVERY TEACHER SHOULD KNOW ABOUT THE PHYSICAL CONDITION OF HER PUPILS—James Frederick Rogers—*Government Printing Office,* 19 p., 10 cents. An elementary guide for those in charge of children.

Science News Letter, December 22, 1945

Question Box

BIOLOGY

What powerful pesticides have been developed? p. 391.

CHEMISTRY

What two new chemical elements were announced in 1945? p. 392.

GENERAL SCIENCE

What are the four top science developments of 1945? p. 396.

Why will there probably be a rush of scientific ideas in the near future, p. 386.

MEDICINE

How are "blue babies" now saved from certain death? p. 394.

How can the unbearable pain of cancer be remedied? p. 388.

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How important was psychological warfare in World War II? p. 395.

TECHNOLOGY

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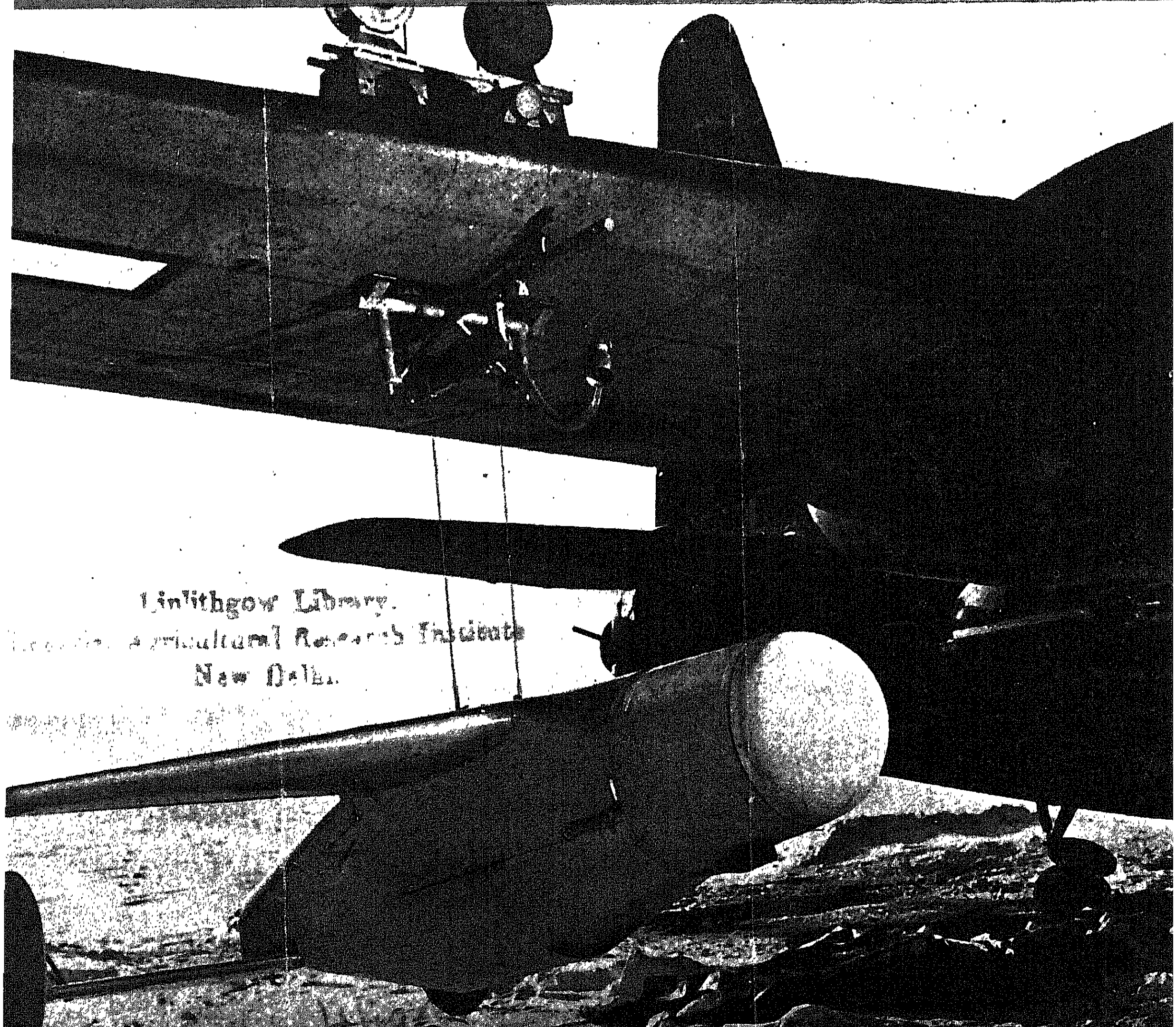
ENCE NEWS LETTER

EEKLY SUMMARY OF CURRENT SCIENCE • DECEMBER 29, 1945



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Self-Guided
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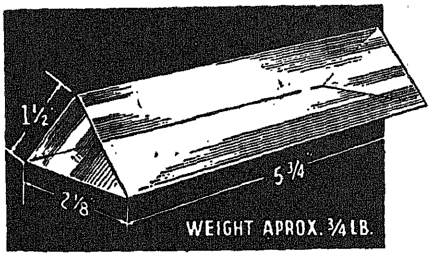

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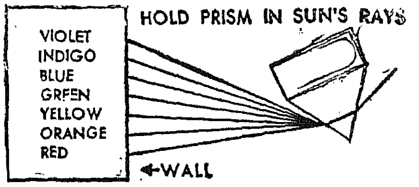

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3001-Q	Lens Surface	20 mms.	14 mms.	2.00
3006-Q	Porro-Abbe	9 mms.	9 mms.	.25
3009-Q	Porro	52 mms.	25 mms.	1.00
3010-Q	Porro	43 mms.	21 mms.	.50
3016-Q	Pentagon	45 mms.	22 mms.	.75
3029-Q	Dove	16 mms.	65 mms.	1.25
3036-Q	80 Degree Roof	60 mms.	36 mms.	4.00
6136-Q	Rhomboid	20 mms.	17 mms.	.50
3049-Q	Right Angle	69 mms.	167 mms.	10.00
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ENGINEERING

Magnetron Tube

Mass production of the heart of radar assisted greatly in making sufficient modern radar to play its important role in war.

➤ THE STORY of how mass production of magnetron tubes, the heart of modern radar, was developed was told by officials of the Raytheon Manufacturing Company, said to be the largest maker of these tubes in the world. The mass production gave a sufficient supply of this essential part to permit the construction of enough radar equipment to meet the war needs both of America and England. Raytheon turned out, it is claimed, over half of all the magnetrons produced in the world.

The early magnetron was a British invention and was brought to this country to the government's Radiation Laboratory on the campus of the Massachusetts Institute of Technology in the summer of 1940. It was capable of generating microwaves of a power theretofore unknown. This English tube was very much improved by scientists at the laboratory, and various improved types, manufactured in America, became standard in all Allied radar equipment.

The magnetron is an oscillator, but magnetron oscillators differ from ordinary radio-frequency oscillators. It uses a magnetic field in conjunction with an electrostatic field to guide the electrons. Also the efficiency of the magnetron oscillator is very high at frequencies where the usual types of radio frequency oscillators refuse even to operate. For this reason magnetron tubes are not only the key to radar, but also to all ultra-high frequency radio designs.

Basically, the cavity magnetron, the type most commonly used, is made up of a heavy cylinder of copper around whose inner diameter a series of identical key holes have been cut with the narrow slot opening into the center hole. Each of the key holes represents a transmitter circuit. In the center of the body is placed an emitting cylinder, usually a nickel sleeve coated with an active material which upon heating produces a copious flow of electrons.

The electrical operation of the cavity magnetron can be best understood by remembering that the oscillators are placed cylindrically around the axis of the cathode, and a means of exciting these cavities must be provided. A magnetic field is applied axially to this diode, which causes the electrons emitted from the cathode to perform circular paths about the cathode. The electric motion can be thought of as an air stream passing a slot, which, when it acquires the correct velocity, causes the cavity to resonate.

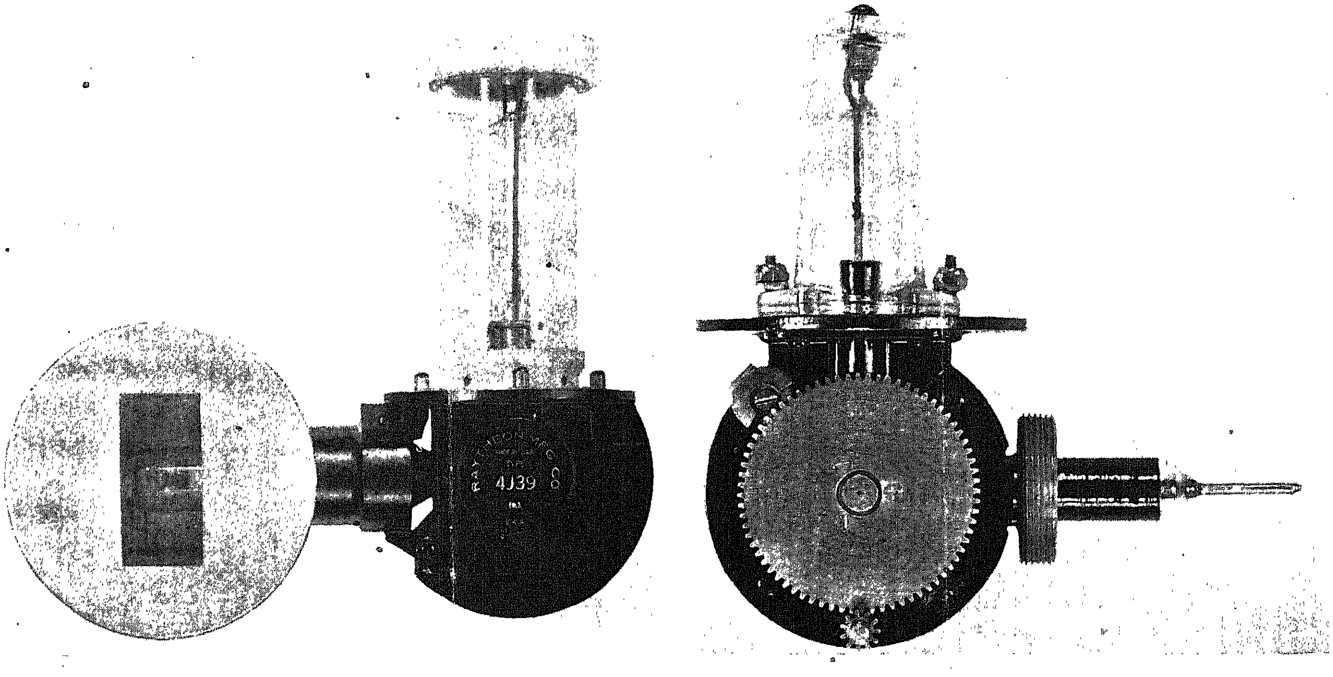
Science News Letter, December 29, 1945

AERONAUTICS-ORDNANCE

Radar-Guided Bat Bombs Blasted Jap Shipping

See Front Cover

➤ LAUNCHED by Navy Privateer patrol bombers outside the range of enemy anti-aircraft fire, and guided to distant targets by radar, Navy "Bat" bombs destroyed many tons of Jap shipping in the last year of the war. Operating on somewhat the same principle as live bats, which emit a short



HEART OF RADAR—The tube at the left is used primarily for high powered search and is a fixed frequency 12 cavity magnetron oscillator capable of delivering 1 megawatt peak power at 3500 megacycles. At the right, is type 2J54B tunable magnetron oscillator. This tube delivers 50 kilowatts peak power under pulsed conditions over a frequency range of 3120 to 3260 megacycles.

pulse of sound and direct themselves by echoes, robot "Bats" are guided by radar echoes. In the official U. S. Navy photograph on the front cover of this SCIENCE NEWS LETTER, a pulley device lifts the robot "Bat" to its launching position under the wing of the plane.

"Bats" were "briefed" on the target selected by the mother plane before being released. After their release, they were piloted by their own radar installation alone to hit the target—following the object despite the most extensive maneuvers.

Science News Letter, December 29, 1945

GEOLOGY

Productive Oil Field

Oklahoma pool is most important discovered since Pearl Harbor. By September of this year, it had produced nearly 25,000,000 barrels.

➤ DEFINITE faith on the part of the owner that there was oil in the area in spite of the lack of geological or geophysical evidence is responsible for the recent discovery of the West Edmond, Oklahoma, oil field, probably the most important oil pool found in the United States since Pearl Harbor. By September, 1945, the field had produced nearly 25,000,000 barrels.

The story of the opening of this field, Oklahoma's largest single oil field, is told in *Mining and Metallurgy*, (Dec.) journal of the American Institute of Mining and Metallurgical Engineers. It is told by E. G. Dahlgren of the Interstate Oil Compact Commission and Dan O. Howard, petroleum geologist of the Oklahoma Corporation Commission.

The area of the field is 26,800 acres, or over 41 square miles, and it is now equipped with 670 producing wells. One company estimates that there are some 600,000,000 barrels of oil in the ground, about one-third of which can be recovered by primary methods, leaving 400,000,000 barrels to be recovered by the various secondary methods of pressure maintenance, water-flooding, and re-pressuring.

The first well was started on Jan. 2, 1943, and on April 28 that year was flowing 522 barrels of light oil in 24 hours. Now, according to the report, the average initial production of the wells in the area is 1,200 barrels a day, with individual wells ranging in initial production from a minimum of 25 barrels to a maximum of 4,800 barrels each 24 hours.

When drilling of the first well was begun, it was planned to drill down to the Wilcox sand, estimated at about 7,350 feet but found at 7,670 feet. No oil was found in the Wilcox sand, however, but there had been a slight indication of oil when the well passed through the Hunton lime formation at a depth of 6,866 feet. It is in the Hunton lime that the oil exists.

"Seven-inch outside diameter casing was set at 7,301 feet through the Hunton lime," the authors state. "A cable-tool unit was moved on the location on March 31, 1943; the well bailed dry and perforated on April 5, 1943. Eleven holes were shot in the casing at from 6,951 to 6,856 feet, and the well started to head through the open casing. On April 28, after additional perforating, and after 2½-inch tubing had been run, the well flowed 522 barrels of oil in 24 hours."

Science News Letter, December 29, 1945

MEDICINE

Spotted Fever Remedy May Exist in B Vitamin

➤ A CHEMICAL remedy for dangerous, sometimes fatal Rocky Mountain spotted fever may exist in one of the B vitamins, para-aminobenzoic acid, it appears from a case reported by Drs. Harry M. Rose, Richard B. Duane and Edward E. Fischel of Columbia University College of Physicians and Surgeons and Presbyterian Hospital, New York (*Journal, American Medical Association,* Dec. 22).

Although a serum for treating the disease was developed a few years ago, no specific chemical remedy has heretofore been found. Results in one case do not prove that this B vitamin chemical is a remedy for the disease, the New York doctors point out, but they are suggestive.

A "precipitous" drop in the patient's temperature occurred when she was given this chemical, and her condition improved after the first 24 hours of treatment. She was entirely free of symptoms within 10 days.

Para-aminobenzoic acid had previously been found very effective in treating Rocky Mountain spotted fever in guinea pigs and it has been used with good results in typhus fever, which is also caused by germs of the rickettsia class.

Science News Letter, December 29, 1945

Rain water that falls in districts near the sea coasts usually contains appreciable quantities of chlorides.

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MEDICINE

Flu Vaccine Available

Is of the same type used by the Army this fall and winter, and is effective against Type B virus. If epidemic grows, demand may exceed supply.

➤ VACCINE against influenza Types A and B, the kind used to vaccinate all Army personnel this fall and winter, is now on the market for civilian use. This vaccine is effective against the Type B virus now causing outbreaks in various parts of the country, totalling some 150,000 reported cases during one week.

Replies to inquiries by telephone and telegram brought the following information: Eli Lilly and Company, the Lederle Laboratories and Pitman-Moore Company have the vaccine available now for civilian use. Pitman-Moore states all its branches are being supplied. Parke Davis will have its vaccine available to civilians before January. The Squibb vaccine will be available for civilian use about Feb. 15.

If the current epidemic grows and creates a sudden demand for large quantities of the vaccine, however, manufacturers may not be able to keep up with the demand. The vaccine cannot be produced overnight. Its production involves growing the influenza viruses on chick embryos and it takes from two to three months to get out a batch of vaccine.

When the manufacturers had supplied the Army's order, they slowed down or stopped production altogether because they had no idea whether there would be any civilian demand. The vaccine is barely out of the experimental stage, physicians were not expected to prescribe it for their patients unless an epidemic developed, and until the last week of November, no signs of an epidemic had appeared in official health reports. Consequently no company has a big supply of the vaccine on hand.

Lederle Laboratories, said to be the biggest producers of influenza vaccine, have enough on hand to vaccinate about 200,000, Dr. Herald R. Cox, associate director of research in charge of virus and rickettsial diseases, said. This company has started up production and will be making about 25,000 doses daily before Christmas, but it will be another month or two before they have any sizable quantities.

The vaccine must be given at least a week or 10 days before a person is exposed to influenza to allow time for immunity to the disease to be built up in the body. At first the dose was set at a single "shot" but this may be changed to two injections each of half the amount or of the full amount. A better immune response is always obtained, Dr. Cox explained, if the immunizing substance, or antigen, is divided into two or three doses. The first one acquaints the body with the new protein material and after that it is used to it and more readily accepts the substance and develops the proper response to it.

The protection given by the vaccine will last six months to a year, it is hoped. Actually scientists are not certain about this point because they have not had enough experience with it.

The vaccine was developed by Dr. Thomas Francis, Jr., and associates of the University of Michigan. It got its first major trial during the influenza epidemic of 1943-44 when controlled studies of it were made by the Army's Commission on Influenza on thousands of men in the Army Specialized Training Program units at eight different universities in different parts of the United States.

Results showed that the ratio of influenza in the unvaccinated to that in the vaccinated was four to one. So authorities expect the vaccine to protect about 75% of those vaccinated and to reduce the severity of the illness in the other 25%.

Science News Letter, December 29, 1945

MEDICINE

Blood Plasma Supply Stretched by Using Gelatin

➤ THE SUPPLY of blood plasma, probably dwindling since donors are no longer stimulated by war's urgency, may be stretched by substituting a gelatin solution in some cases, it appears from a report by Drs. T. H. Seldon, J. S. Lundy, R. C. Adams and E. N. Cook of the Mayo Clinic.

Its use without adverse effects in more than 400 cases, they report in the Proceedings of the Staff Meetings of the Mayo Clinic, was not as a source of protein for nourishment but solely as a plasma substitute to increase the blood volume.

Some of the patients had a little bleeding after operations but not enough to warrant transfusion of whole blood. Others had been given two to three pints of whole blood for shock or hemorrhage and needed more fluid in their veins but not necessarily blood or plasma. Elderly patients whose blood pressure tended to fall and other patients who needed supportive treatment after operations but not necessarily blood or plasma were also given the gelatin solution.

Science News Letter, December 29, 1945

CHEMISTRY

Naming New Elements Is Problem to Discoverer

➤ NAMING the two newest and heaviest chemical elements, numbers 95 and 96, is proving quite a problem to their discoverer, Dr. Glenn T. Seaborg of the University of California and the University of Chicago.

One difficulty is that the astronomers have not discovered any planets of the solar system beyond Pluto and therefore the newest transuranium elements cannot be named by following the system used in naming number 93, neptunium, named after planet Neptune, and number 94, plutonium, named after planet Pluto. Plutonium is one of the elements that can be used in making atomic bombs.

One possibility might be to rely on some property of the new elements in

DR. GLENN T. SEABORG

naming them, Dr. Seaborg said, speaking as guest of Watson Davis, director of Science Service, on the "Adventures in Science" radio program over the nationwide network of the Columbia Broadcasting System. Dr. Seaborg indicated that he might shortly name element 95, at least.

He has already received many suggestions for naming the new chemical babies. •

Science News Letter, December 29, 1945

MEDICINE

Cleft Abdomen Baby Lives

Prompt operation in which silk stitches were used to pull together gradually the sides of the opening, saves life of baby boy.

➤ IN RICHMOND, Va., in July, 1942, a baby boy was born with the rare, usually fatal condition of cleft abdomen. His liver, gallbladder, stomach, colon and small intestines pushed through a five-inch wide opening that extended from the lower end of the breastbone to the navel.

Today, he is a normal three and a half year old child, one of the six babies recorded in medical history who have survived being born with this defect. His case was reported by Dr. Frank S. Johns, of the Johnston-Willis Hospital in Richmond, at the meeting of the Southern Surgical Association.

Prompt, efficient operation to repair the defect plus careful handling by the obstetrician, Dr. M. Pierce Rucker, when the baby was born, saved his life.

Dr. Rucker noticed the defect as the baby was born. He took care that the thin membrane covering the organs that pushed through the cleft was not broken. Compresses wet with salt solution were placed over the cleft abdomen and the baby was sent immediately to the surgical department.

Within a half hour after his birth, the baby was under ether and Dr. Johns was carefully pulling together with silk stitches the upper and lower ends of the cleft. He had first tried to force the liver, stomach and other organs gently back into what should have been their normal position.

At every such attempt, however, the baby would stop breathing. Finally, he put in the silk stitches and gradually pulled the sides of the opening together, leaving the unbroken membrane as a permanent overall covering. In the center, where the cleft had been almost five inches wide, a space about an inch wide was left open.

Adhesive strips were placed over the entire length of the wound, a dressing put on, and the baby returned to the nursery. The entire strapping was kept on for about six weeks or until there was complete granulation under it.

On the fifth day after the operation, the baby was put to the breast. He had previously been given lactose feedings and diluted breast milk as well as injections of normal salt solution and, later, of plasma from his father's blood.

When 13 days old he went home from the hospital, weighing six pounds five ounces, a satisfactory gain over his birth weight of five pounds eleven and three-fourths ounces.

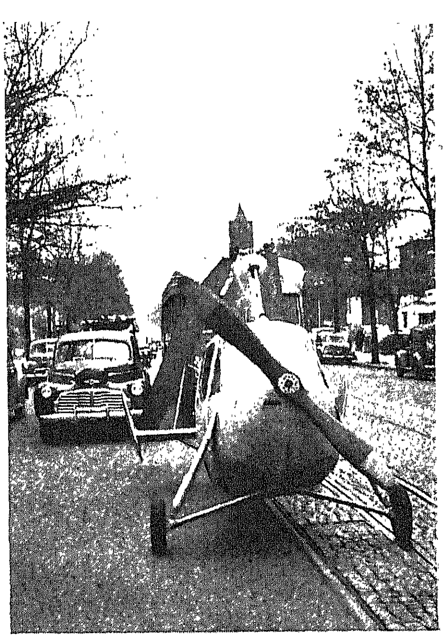
The first known case of cleft abdomen was reported in 1557. Dr. Johns found reports of 87 cases altogether. Of these 58 were stillborn monstrosities. In 20 cases the baby was living at birth and normal except for the abdominal defect, but no attempt was made to repair it and these children all died. In nine, including the present case, attempts were made to repair the defect but only six of the babies survived.

The condition, which has the technical name of gastroschisis, is believed to be a structural abnormality and not one of growth. It originates in the embryo. If there is not enough liquor in which the embryo normally floats freely, or if the embryo or its sac is sticky, the embryo and the sac become united and that part of the embryo cannot develop normally.

This theory is believed to explain not only abdominal cleft but other abnormalities with which babies are sometimes born. Pressure from tumors in the mother's abdomen or deformities of the uterus are other possible causes of congenital abnormalities and monstrosities.

Science News Letter, December 29, 1945

Brazil nuts, shaped like segments of an orange, grow a dozen or more in a pod; this accounts for their shape.



LAST TRIP—The roadable autogiro, developed by the Pitcairn Autogiro Company ten years ago makes its last trip down North Capitol Street on its way to the Smithsonian Institution. CAA photograph.

BIOCHEMISTRY

Acid of 1080 Found in South African Plant

➤ NATURE ANTICIPATED man in manufacturing the stuff that makes the new super-ratbane, 1080, the deadliest thing that has yet hit the rodent world. Long before American chemists made a synthetic combination of sodium with fluoroacetic acid, which is the basis of 1080, a poisonous plant in South Africa was producing the same acid in its living tissues. Not only that, but the natives had found out that they could use the plant to poison rats.

The plant, which bears the Boer-Dutch name "gifblaar" (poison-blister), was analyzed for its poisonous principle by a South African scientist, Dr. J. S. C. Marais. He found that its toxicity was due to fluoroacetic acid, and suggested that this acid and its chemical relatives might be a source of valuable poisons and insecticides. American scientists, working under wartime pressure, made an independent discovery of the value of the same acid and its compounds without knowing of the previous work.

The botanical name of the poison-producing plant is *Dichapetalum cymosum.* It is a kind of second cousin to the euphorbias, most of which are also poisonous.

Science News Letter, December 29, 1945

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ASTRONOMY

Mars Passes Saturn

On January 10 this planet will be only 59,463,000 miles away from the earth and will shine brilliantly in the constellation of Gemini, the twins.

By JAMES STOKLEY

➤ ALTHOUGH the Second World War is now happily over, the planet Mars, identified by ancient superstitions with the God of War, makes a visit to earth this month. It is not a particularly close one, but on Jan. 10 this planet will be a mere 59,463,000 miles away, and will shine brilliantly, as it does through the month, in the constellation of Gemini, the twins, high in the eastern evening sky.

Then Mars will be just south of the bright star Pollux, one of the twins, and south of Mars will appear another planet, Saturn. At the beginning of the month Mars will be to the east of Saturn but on Jan. 22 will pass his sluggish brother, as both planets are now moving in a westerly direction.

These planets are shown on the accompanying maps, along with the January evening stars, as they will be seen about 10:00 p. m. at the beginning of the month and at 8:00 p. m. on Jan. 31.

Just below and to the right of the triple group formed by Pollux, Saturn and Mars is the first magnitude star Procyon, in Canis Minor, the lesser dog. Still lower and farther to the right is Canis Major, the greater dog, with Sirius, the brightest star of the night sky. Of course Sirius is exceeded in brilliance by some of the planets, but they shine by reflected sunlight, not by their own luminosity as do the stars.

Many Stars

Above and to the right of Sirius is Orion, the warrior, one of the most conspicuous of all constellations, with the three stars in a row which form the belt. Above the belt is Betelgeuse and below is Rigel, both stars classed in the first magnitude. Continuing still farther to the right and upwards, we come to Taurus, the bull, with brilliant, ruddy Aldebaran to mark his eye. And when we continue northwards from Taurus we come next to Auriga, the charioteer, with another first magnitude star, Capella. Thus Pollux, Procyon, Sirius, Rigel, Aldebaran and Capella form a brilliant ring of stars, with Betelgeuse near the center and, at present, their grandeur augmented by the presence of Mars and Saturn.

Though there are other first-magnitude stars in the sky, they are not in a position to be seen at their best. There is Regulus, in Leo, the lion, low in the east; and Deneb, in Cygnus, the swan, low in the northwest. This rises higher later in the evening, and then another planet appears, for Jupiter, near Spica, in Virgo, the virgin, rises around midnight.

Mars Is Closer

Last year, even when the planet Mars was in the evening sky, it was hard to see because of its great distance as it stood on the farther side of the sun. But now earth and Mars are both in the same direction, and we make a close approach to each other, on Jan. 10. This approach occurs when Mars is almost at its greatest distance from the sun, and the earth nearly at its closest, so the two planets are much farther apart than they can be under the most favorable positions. In 1924, for instance, Mars was only about 35,000,000 miles away. These differences arise from the fact that the orbits of Mars and earth are not concentric circles, but ellipses. Just now the planets are in widely separated parts of their paths.

Close to Mars in the sky is the planet Saturn, which also is making an approach to the earth, although it is far beyond Mars. On Jan. 13 Saturn is closest, at a distance of 750,477,000 miles. Thus, like its brother, it is somewhat brighter than usual, and the two planets can now be watched in the midst of an interesting dance step.

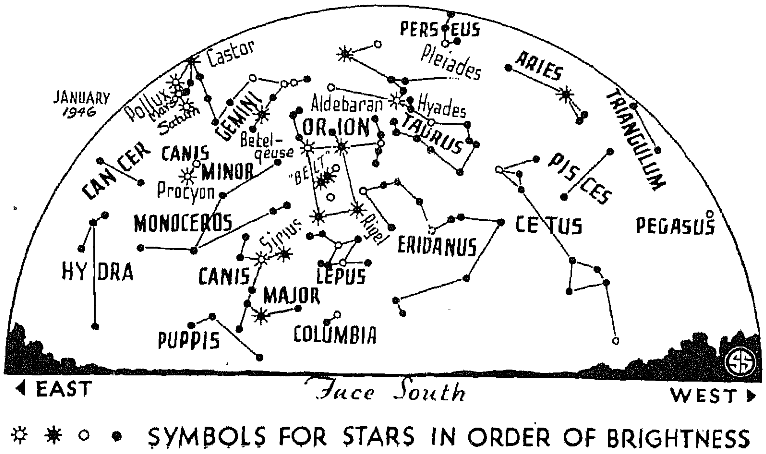
Planets Retrograde

The general motion of the planets through the sky from day to day is west to east, the same as for the sun and moon. However, at certain times of year, as the earth overtakes its brethren moving in larger orbits, they seem to retrograde, or to move from east to west. The effect is exactly the same as that observed when you are in an express train, and go by a freight. Even though the latter is going the same direction as you, it seems to be traveling the other way, because you are observing it from a moving platform.

Saturn "Stands Still"

Last Nov. 6 the earth and Saturn reached such a position that Saturn seemed to stand still in the sky, and then turn around for its retrograde movement. Mars did the same thing on Dec. 5. Thus, although Mars had passed Saturn, while both were moving easterly, on Oct. 26, they are now coming together again, and Mars will pass Saturn on Jan. 22. On Feb. 22 Mars turns around and resumes its easterly movement, while Saturn does the same on March 20. Just before that, however, on March 18, Mars will pass Saturn for the third time.

There is still another body that is close this month, for on Jan. 2 the earth will be at perihelion, when it is nearest the



Do You Know?

Aluminum clothespins may soon replace the familiar pin of wood.

Approximately 10,000 derivatives of *sugar* have been made by chemists.

Vitamin P is able to increase the concentration of calcium in the blood.

Onions in storage keep best in darkness and dryness, and in a temperature slightly above freezing.

The thickness of the *skull* ranges from less than one-eighth of an inch to almost half an inch.

If *castor bean* growing can be adapted to American mechanized farm harvesting, it can become a permanent and profitable crop in the United States.

Narcotic plants or stimulants have been used since ancient days for purposes of exhilaration, intoxication or in tribal ceremonies.

The American *potato* crop this year will be about 433,000,000 bushels; this is 15% above the average of the past 10 years, and the second largest crop ever grown.

Flax was the only outstanding important crop of 1945 in France; the production surpassed prewar averages, which means good news for French textile mills.

Sulfur played an important part in winning the war, during which over 15,000,000 tons were mined in the United States to supply all domestic needs and much of the needs of the Allies.

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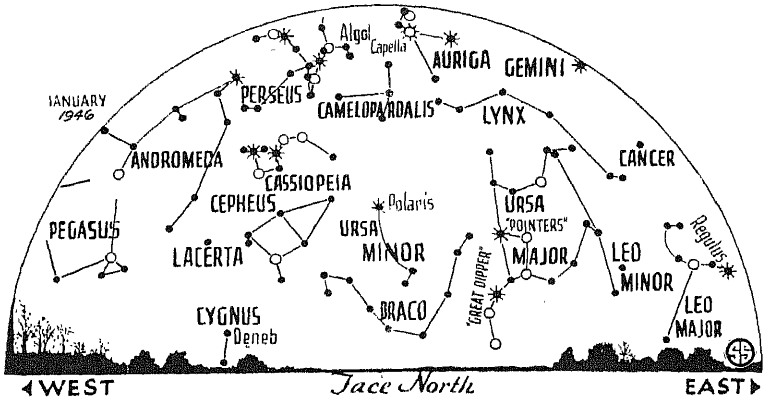


sun for the entire year. The distance then will be 91,455,000 miles, or about 3,000,000 miles closer than it will be in July. This is often a surprise to people who think we should be warmer when the sun is nearest. Actually, of course, it is the height of the sun in our sky that determines how much heat we get from it. Now, even at noon, it is so low that its rays are spread thinly over the ground. In July, by way of contrast, the noon-day sun comes well overhead, and its rays of light and heat, falling more nearly vertically, are much more concentrated.

Celestial Time Table for January

Jan.	EST	
2	1:00 p. m.	Sun nearest, distance 91,455,000 miles
3	7:30 a. m.	New moon Partial eclipse of sun, visible from South Pacific Ocean and Antarctica
10	2:00 a. m.	Mars nearest distance 59,463,000 miles
	3:27 p. m.	Moon in first quarter
12	1:00 a. m.	Saturn opposite sun
13	8:00 p. m.	Mars opposite sun
14	7:00 a. m.	Moon nearest, 227,540 miles
16	11:17 p. m.	Moon passes Saturn
17	2:02 a. m.	Moon passes Mars
	9:46 a. m.	Full moon
22	12:00 noon	Mars passes Saturn
24	5:47 a. m.	Moon passes Jupiter
	12:00 mdt.	Moon in last quarter
26	2:00 a. m.	Moon farthest, 251,320 miles

Subtract one hour for CST, two hours for MST, and three for PST.

Science News Letter, December 29, 1945

OPTICS

Optics Imitates Nature

➤ ONCE MORE science finds it profitable to imitate nature. The latest instance is the use of multiple lens systems similar to the eye of a fly to produce optical spectral patterns for comparison with the X-ray spectral patterns found in examination of the structure of crystals. When the spatial arrangement of the lens in the artificial fly's eye is similar to the projection of the crystal structure on a plane, the optical spectra have the same arrangement as the X-ray images.

An improved technique for constructing such "eyes" is described by Prof. W. L. Bragg and A. R. Stokes of the Cavendish Laboratory, Cambridge, (*Nature*). Previously, the grid of lenses had been made by using pinholes in a square array, with 40 pinholes to the centimeter. This produced fuzzy images and suffered from the further difficulty that the pinholes were liable to be blocked by specks of dust. The new method is to replace the pinholes by small lenses embossed on the surface of a sheet of transparent plastic and to cover the rest of the sheet with a paper mask. The minute lenses (0.06 centimeter in diameter, 0.5 centimeter in focal length) are produced by pressing a steel sphere into a soft copper block, and then casting or pressing the plastic on the block. The resulting images are sharper and more uniform in intensity than those given by the pinhole method.

The new method makes possible a rapid comparison of various geometrical arrangements for the structure of a given crystal. Previously, the determination of crystal structure from X-ray photographs required long and tedious calculations. Now a first approximation to the structure can quickly be obtained by a trial-and-error process of constructing a series of gratings with different geometrical arrangements. It should prove a valuable tool in speeding up routine X-ray determinations of crystal structure.

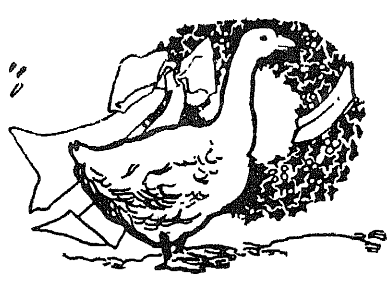
Science News Letter, December 29, 1945

Some *spiders* do not spin webs to catch their prey; they lie in ambush and pounce upon passing insects and grubs.

ETHNOLOGY

NATURE RAMBLINGS

by Frank Thone



Yuletide Goose

➤ TURKEYS were abundant in most markets this year, to meet the needs of Yuletide feasting. Tremendous numbers of them were killed and sold for Thanksgiving, only a month or so ago, yet the market display cases were again stacked high with dressed turkeys, and you could hear the gobblings of penned live birds wherever you went a-shopping.

Turkey for Christmas is pretty much an American institution. Our forebears in Europe, where the Christmas feast originated, feasted on goose—unless, indeed, they belonged to the wealthier nobility and could afford swan or peacock. But for the solid frankelyn and the substantial burgher, goose was the bird, as all accounts of Yule feastings, from Chaucer to Dickens, will well attest.

The goose meant more to our ancestors than the turkey does to us. The present-day American home gets turkey twice a year—at Thanksgiving and Christmas. For most modern small families a turkey is just too big; even the "streamlined" birds recently bred by Department of Agriculture scientists bulk a bit large on an apartment dinette table. Our forefathers and foremothers had bigger families, did more work out-of-doors, and lived in chillier dwellings, so they could use more meat—and fatter meat, too. They ate goose often; the Christmas goose was merely the biggest, best-favored bird in the flock, set apart for the special occasion.

Moreover, the usefulness of the goose was not finished when the last bit of meat had been picked from its bones. Usually there was a good deal of surplus fat, and this, carefully saved up in a jar, was used for choicer cooking, where something finer than lard was called for. Goose-grease with various home medicaments added also became a whole series of sovereign remedies. Even yet, many a balding elderly citizen can remember how he got goose-grease and turpentine rubbed on his chest for coughs and colds.

The goose also yielded fine down and small breast-feathers for the voluminous feather-beds in which our ancestors slept. (Literally in them, for you sink into a thick feather-bed until you think you are going to smother!) And not satisfied with that, our ancestors pulled another feather-bed over the top, in lieu of blankets or quilts. Country folk in Europe still sleep that way.

Finally, the stiff quills of wing and tail had their uses. Skillfully cut with pen-knives, they became pens—the only pens that were known for centuries. Trimmed otherwise, they winged the clothyard shafts that made the bowmen of England and Wales both famous and feared throughout Christendom and deep into Heathenesse. Thus the goose, despite its undeserved reputation for silliness, had its place in the tactics of war and at the council-table where treaties were signed.

Science News Letter, December 29, 1945

RADIO

Shoran Made Bombing Possible in Overcast

➤ A LITTLE-KNOWN radar navigational device called "Shoran" was used with remarkable success in bombing German targets through overcast in the last stages of the war in Europe and permitted bombing comparable with the accuracy of that in clear weather obtained with the famous Norden bombsight.

Shoran was one of the last radar systems applied tactically in Europe and was put into use only six months before the Nazi surrender. It was started, however, at Wright Field in 1939, in a search for an efficient short-range air navigation system. The Radio Corporation of America took up the problem, and the system is the result of cooperative work by Army electronic experts and scientists of RCA.

Ground stations are required for Shoran operation and a special airborne computer unit is essential. The system requires accurate maps and mathematics as well as suitable locations for the ground equipment. As its name implies, Shoran is short-ranged and is successful only if the range from ground station to target is not more than 250 miles, and if the computations on the airborne computer are carefully and accurately made.

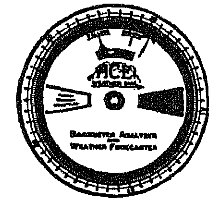
For bombing operations, location of the bomb release point is accomplished by means of electrical waves instead of by optical bombsight. When used as a bombing device, a computer unit to determine distances, speed of approach, and bomb release point is added to the primary navigation equipment.

Science News Letter, December 29, 1945

Aluminum is very active chemically but tarnishes only slightly in air.

ERRATA, Vol. 48, Nos. 1-26, July-December, 1945

PAGE	TITLE BEGINS	CORRECTIONS
44	Boric Acid Treatment	Line 6, D *for* R.
48	Special Radio Receivers	Line 8, *after* batteries, *insert* or operate on.
130	Worm Is Both Father and Mother	Line 1, *to read,* live in river and lake bottom mud.
170	Precious Waste Products	By-line, Mooers *for* Moores.
172	Super-Rough-on-Rats	Par. 2, lines 3 and 4 *to read,* it was one in a series of toxic.
183	Nests with Awnings	Lt. Aldrich *for* Dr. Aldrich.
213	Attacks 1,000 Homes	Par. 2, lines 2-3, was comparable to *for* exceeded; lines 4-5, War *for* German blitz.
227	Carbon Dioxide for Polio	Par. 2, line 8, G. Peyton Kelley *for* G. Pelton Kelly.
272	Measurement Lamps	Photograph shows an U.H.F. truide transmitting tube.
309	Chemical War on Allergy	Par. 3, line 6, departure *for* department.
317	Simplest Engine	Line 3, *after* recently, *insert* during the meeting of the Soaring Society of America.
338	Arsenic Poison Remedy	Par. 8, line 4, benzylbenzoate *for* methylbenzoate.
341	Atom Bomb Nobelists	Col. 3, line 29, exclusion *for* exclusive.



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• Books of the Week •

BALL AND ROLLER BEARING ENGINEERING—Arvid Palmgren—trans. by Gunnar Palmgren and Bruce Ruley—*SKF Industries*, 270 p., charts, illus., $1.75. Intended to serve as a fundamental text.

CLIMBING OUR FAMILY TREE: How Living Things Change and Develop—Alex Novikoff—*International Publishers*, 96 p., illus., $1.85. Evolution for boys and girls written by an instructor in biology at Brooklyn College.

CONTRIBUTIONS TO EMBRYOLOGY, Vol. 31, nos. 198-206, *Carnegie Institution of Wash.*, 176 p., charts, illus., $4.50 paper, $5 cloth.

A GUIDE TO COLLEGES, UNIVERSITIES, AND PROFESSIONAL SCHOOLS IN THE UNITED STATES—Carter V. Good, ed.—*American Council on Education*, 681 p., $5. Designed primarily for the guidance of veterans who wish to attend college under the GI Bill of Rights. Arranged in tabular form by both college and course.

PERSONALITY FACTORS IN COUNSELING—Charles A. Curren—*Grune & Stratton*, 287 p., charts, $4. Twenty phonographically recorded interviews.

PROCEEDINGS OF THE INDIANA ACADEMY OF SCIENCE FOR 1944—Vol. 54—R. C. Corley, ed.—*State Library, Indianapolis*, 233 p., illus., $3. Technical papers by members of the academy.

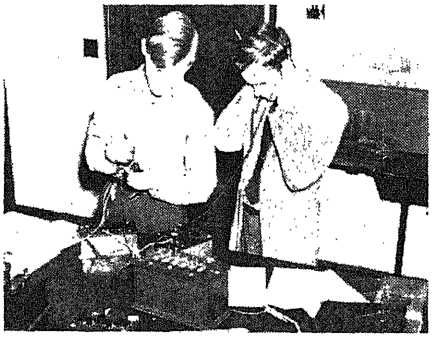
THE REFUGEES ARE NOW AMERICANS—Maurice R. Davie and Samuel Koenig—*Public Affairs Committee*, 32 p., illus., 10 cents. Based on a nation-wide study of the adjustment of refugees and their effect on our society, conducted by the Committee for the Study of Recent Immigration from Europe.

SAFE WORK PRACTICE IN WOODWORKING—G. Harold Silvius and Gerald B. Baysinger—*American Technical Society*, 82 p., illus., 85 cents. Safety education arranged according to tools and machines, with bibliography and index.

THE SCIENCE AND ART OF PERFUMERY—Edward Sagarin—*McGraw*, 268 p., illus., $3. Covers the history of perfumery, the raw materials of the perfumes and the methods of their production.

VALENCY: Classical and modern—W. G. Palmer—*Cambridge University Press*, 242 p., charts and illus., $2.50. Includes a history of valency, application of electronic theory to the heavier elements, and current developments.

Science News Letter, December 29, 1945



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NUTRITION

Quick-Frozen Tomatoes Soon To Be on Market

➤ FROZEN tomatoes, whole, sliced, and as tomato juice, soon will be merchandised in the same manner as other frozen food products, John E. Nicholas, agricultural engineer of the Pennsylvania State College, predicted. He has stored satisfactorily all of these products in his laboratory.

For freezing, whole or in slices, tomatoes should not be too juicy, he pointed out. This year the early crops from both greenhouse and field proved best.

Both whole fruits and slices must be frozen very rapidly. Therefore they should not be wrapped until the freezing process is complete. Whole fruits require a temperature of 20 degrees below zero Fahrenheit or lower, but it is possible to freeze half-inch slices in direct contact with a freezer plate or air blast at 10 below. For good results, the tomatoes should freeze in 30 minutes or less. They may be placed on cellophane or a wire screen for ease in handling, Mr. Nicholas stated.

When completely frozen, the tomatoes or tomato products may be wrapped in cellophane, packaged in vapor-moisture-proof containers, or glazed by dipping in ice water. Whole tomatoes which have been frozen quickly and stored at below-zero temperatures will slice satisfactorily when partially thawed and will not break down if completely thawed out.

Tomato juice for freezing is prepared in the usual manner. It may be frozen in a large open tray and then broken into pieces of convenient size for packaging, or it may be frozen in glass jars or moisture-proof paper containers. It thaws enough for use if allowel to stand at room temperature for about an hour Mr. Nicholas explained.

Science News Letter, December 29, 194

AERONAUTICS

Engine Permits Speeds Over 500 Miles-an-Hour

➤ STREAMLINED like a torpedo, new engine for jet-propul ion will spee planes well in excess of 500 miles a hour, it is claimed by General Electri in whose factory in Schenectady the ne powerplant was designed and constructed. It functions most efficientl when running at nearly full throttl and is intended for speedy long-rang flights.

The new motor is an axial flow turbo jet engine. It was developed for th Army Air Forces, but is suitable for us in civilian planes. It marks definite improvements in aerodynamic design an in fuel consumption. It makes possibl greater range and more economical operation of airplanes than earlier turboje engines. Also, because of its torpedo shaped body, it will fit more snugly int the wings of a plane than any powerfu reciprocating engine.

The two principal parts of the engine the air compressor and the combustio chamber, are directly in line. In operation, air rams into the relatively smal diameter axial flow compressor, and after compression, is forced almost in direct line into combustion chamber There fuel is added, usually kerosene. I burns intensely, creating the gases tha expand through the buckets of a turbine and pass out the jet exhaust, givin the reaction push that drives the plan

Science News Letter, December 29, 194

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CHEMISTRY

New Nitric Oxide Process

Efficient, simple and inexpensive method developed in the laboratories of the University of Wisconsin. Will replace other production methods.

➤ NITRIC OXIDE, essential chemical in the manufacture of nitrate fertilizers and explosives, can now be made by an efficient, simple and inexpensive method developed in the chemical laboratories of the University of Wisconsin. It promises to replace the electric-arc and the German Haber methods of nitrate production, both of which are expensive and require extensive capital investments.

The new nitrogen fixation process was developed under the direction of Prof. Farrington Daniels from 1939 until 1944, then by William G. Hendrickson in Prof. Daniels' absence. The fundamental theoretic concept was proposed first by Dr. F. G. Cottrell of the Research Corporation. Patent applications have been made by the Wisconsin Alumni Research Foundation, a non-profit organization.

As is well known, air is made up principally of mixed but chemically uncombined nitrogen and oxygen. To combine them chemically to form nitric oxide, a temperature of 4,200 degrees Fahrenheit must be reached, and to make them stay combined the nitric oxide formed must be cooled almost instantaneously to at least 2,800 degrees.

In the electric-arc process, in which the extreme temperature is reached, air is passed through a high-voltage current leaping across the gap between two electrodes. In the Haber process, developed in Germany, ammonia is used as the go-between for the production of nitric oxide. Both processes are costly and for both extensive and expensive plants are required.

The new Wisconsin process appears deceptively simple. It consists of blowing large quantities of air through a hot bed of refractory pebbles to pre-heat the air, then through an extremely hot gas-fired furnace, and finally through a second pebble bed where the gas is chilled very rapidly and the heat is released and stored for use in pre-heating the incoming air when the flow is reversed.

"In effect, the plant is a two-way gas furnace," Mr. Hendrickson explains. "It was previously impossible to get this extremely high temperature because the flame temperature of fuel gases burning in ordinary air is much less than 4,200 degrees.

By pre-heating the air in a pebble bed, the flame temperature rose to 4,200 degrees, he said, "and at the same time two other objectives were accomplished—one bed of the furnace was cooled and the opposite one heated, so by periodically reversing the stream of air we could heat the nitrogen and oxygen to the temperature at which they would combine and almost immediately chill the resulting nitric oxide to prevent decomposition."

Science News Letter, December 29, 1945

PLANT PATHOLOGY

Pineapples Flower Full Year Ahead of Time

➤ PINEAPPLES have been induced to flower a full year ahead of their normal blossoming time by applications of growth-promoting chemicals, sometimes called synthetic hormones, in experiments at the Institute of Tropical Agriculture. Results are reported briefly by Dr. J. van Overbeek (*Science*, Dec. 14).

The chemical used in most of the experiments was naphthaleneacetic acid, called "NA" for convenience. Also used was 2,4-dichlorophenoxyacetic acid, which has recently received considerable public notice as a weed-killer under its convenience-designation, 2,4-D. In the pineapple-stimulating experiments, however, the concentrations were kept far below those used for weed eradication. The chemical was used in a dilution of five parts per million of water, and about a wineglassful of the solution applied to each plant. This concentration is only about one per cent as strong as that needed for killing weeds.

"The following conclusions," states Dr. van Overbeek, "may be drawn from these observations:

"One ounce of either NA or 2,4-D is a sufficient amount for inducing flowering in 113,000 plants, which is equivalent to a pineapple plantation of 11 acres.

"One dollar's worth of chemical (2,4-D, at the current price of $7.50 per kg) will treat over one-half million of plants (536,000), the equivalent of 53 acres of pineapples."

Science News Letter, December 29, 1945

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New Machines and Gadgets

TYPEWRITER type cleaner is a sheet of paper, to insert in the machine, which has a narrow strip of sticky material extending lengthwise along its center. With the ribbon either set at neutral or removed, the operator types in the usual manner. The type hits the sticky substance which removes the dirt.

Science News Letter, December 29, 1945

BUILT-IN fire extinguishers on diesel locomotives will put out fire in the engine or along the right-of-way. By the operation of a single control, they will discharge either high-expansion mechanical foam for oil or gasoline fires, or plain water for fires in adjacent brush.

Science News Letter, December 29, 1945

PLYWOOD splints were used by the Navy during the war for broken legs aboard ship because of their lightness and buoyancy in case the wearer was forced overboard in naval action. They were held in place by bandages instead of by straps as are conventional metal splits.

Science News Letter, December 29, 1945

DIRECT-READING portable fluxmeters were developed during the war to give precise measurement of the field strengths of magnets used with magnetrons essential in radar and other electrical instruments. They consist principally of two special D'arsonval galvanometers and a delicate probe search coil.

Science News Letter, December 29, 1945

PLUCKING machine removes feathers, even pinfeathers, from fowl at a rate of 200 chickens an hour. Essential parts of the machine are scores of rubber fingers mounted on a drum which turns at high speed. The picture shows a turkey being made ready for market.

Science News Letter, December 29, 1945

EGG-CANDLING device is a small metal box within which an electric light is suspended in front of an adjustable reflector. Opposite the reflector is a lens to concentrate the light through a rubber-rimmed opening in which the egg is placed. The improved candler secures the maximum use of the light source.

Science News Letter, December 29, 1945

PIE HOLDER, the shape and size of a piece of pie, prevents the delicacy from crushing in a lunch box. It consists of two similar trays of pie-thickness depth with one open side. Pivoted at their apexes in reversed position, when fitted together one forms a base, the other a cover, and all sides are protected.

Science News Letter, December 29, 1945

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Question Box

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ASTRONOMY

How close to earth will Mars be on Jan. 10? p. 407.

CHEMISTRY

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What chemical may serve as a spotted fever remedy? p. 404.

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ENGINEERING

What are magnetron tubes? p. 408.

GEOLOGY

Where is the most important oil field discovered since Pearl Harbor located? p. 404.

MEDICINE

How can the supply of blood plasma be increased? p. 405.

How was the life of the cleft abdomen baby saved? p. 406.

What flu vaccine is now available to the public? p. 405.

RADIO

How did Shoran help bombing? p. 409.

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